SITE-SPECIFIC UFP
QUALITY ASSURANCE PROJECT PLAN

SUPERIOR BARREL AND DRUM SITE
798 Jacob Harris Road
Elk Township, New Jersey 08028

Prepared By:

Removal Support Team 2
Weston Solutions, Inc.
East Division
Edison, New Jersey 08837

DC No.: RST 2-02-F-2782
TDD No.: TO-0029-0151
EPA Contract No.: EP-W-06-072

May 2014

TABfLE OF CONTENTS

ATTACHMENTS

ATTACHMENT A: Figure 1: Site Location Map

ATTACHMENT B: EPA/ERT SOPs

SOP No.: 2001 - General Field Sampling Guidelines
SOP No.: 2016 - Sediment Sampling

LIST OF ACRONYMS

ADR	Automated Data Review
ANSETS	Analytical Services Tracking System
AOC	Acknowledgment of Completion
ASTM	American Society for Testing and Materials
CEO	Chief Executive Officer
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
CFM	Contract Financial Manager
CO	Contract Officer
COI	Conflict of Interest
COO	Chief Operations Officer
CRDL	Contract Required Detection Limit
CRTL	Core Response Team Leader
CRQL	Contract Required Quantitation Limit
CQLOSS	Corporate Quality Leadership and Operations Support Services
CWA	Clean Water Act
DCN	Document Control Number
DESA	Division of Environmental Science and Assessment
DI	Deionized Water
DPO	Deputy Project Officer
DQI	Data Quality Indicator
DQO	Data Quality Objective
EM	Equipment Manager
EDD	Electronic Data deliverable
ENVL	Environmental Unit Leader
EPA	Environmental Protection Agency
ERT	Environmental Response Team
FASTAC	Field and Analytical Services Teaming Advisory Committee
GC/ECD	Gas Chromatography/Electron Capture Detector
GC/MS	Gas Chromatography/Mass Spectrometry
HASP	Health and Safety Plan
HRS	Hazard Ranking System
HSO	Health and Safety Officer
ITM	Information Technology Manager
LEL	Lower Explosive Limit
MSA	Mine Safety Appliances
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response

LIST OF ACRONYMS (Concluded)

PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, Sensitivity
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PIO	Public Information Officer
PM	Program Manager
PO	Project Officer
PRP	Potentially Responsible Party
PT	Proficiency Testing
QA	Quality Assurance
QAL	Quality Assurance Leader
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RC	Readiness Coordinator
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
RSCC	Regional Sample Control Coordinator
RST	Removal Support Team
SARA	Superfund Amendments and Reauthorization Act
SEDD	Staged Electronic Data Deliverable
SOP	Standard Operating Practice
SOW	Statement of Work
SPM	Site Project Manager
START	Superfund Technical Assessment and Response Team
STR	Sampling Trip Report
TAL	Target Analyte List
TCL	Total Compound List
TDD	Technical Direction Document
TDL	Technical Direction Letter
TO	Task Order
TQM	Total Quality Management
TSCA	Toxic Substances Control Act
UFP	Uniform Federal Policy
VOA	Volatile Organic Analysis

CROSSWALK

The following table provides a "cross-walk" between the QAPP elements outlined in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP Manual), the necessary information, and the location of the information within the text document and corresponding QAPP Worksheet. Any QAPP elements and required information that are not applicable to the project are circled.

QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual		Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
Project Management and Objectives				
2.1	Title and Approval Page	- Title and Approval Page	Approval Page	1
2.2	Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	TOC Approval Page	2
2.3	Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	Approval Page	3 4
2.4	Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications - Special Personnel Training Requirements	2	5 6 7 8
2.5	Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	1	9 10
2.6	Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria	3	11 12
2.7	Secondary Data Evaluation	- Sources of Secondary Data and Information - Secondary Data Criteria and Limitations	1 2	13

QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
2.8 Project Overview and Schedule 2.8.1 Project Overview 2.8.2 Project Schedule	- Summary of Project Tasks - Reference Limits and Evaluation - Project Schedule/Timeline	4	14 15 16
Measurement/Data Acquisition			
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures 3.1.2.4 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures 3.1.2.5 Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	- Sampling Design and Rationale - Sample Location Map - Sampling Locations and Methods/SOP Requirements - Analytical Methods/SOP Requirements - Field Quality Control Sample Summary - Sampling SOPs - Project Sampling SOP References - Field Equipment Calibration, Maintenance, Testing, and Inspection	5	17 18 19 20 21 22
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical SOPs - Analytical SOP References - Analytical Instrument Calibration - Analytical Instrument and Equipment Maintenance, Testing, and Inspection	6	23 24 25
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection, Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	7	27 26
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples - Screening/Confirmatory Analysis Decision Tree	5	28

QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records - Analytical Services - Data Management SOPs	6	29 30
Assessment/Oversight			
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments - Audit Checklists - Assessment Findings and Corrective - Action Responses	8	31 32
4.2 QA Management Reports	- QA Management Reports		33 33
4.3 Final Project Report	- Final Report(s)		
Data Review			
5.1 Overview			
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process - Validation (Steps IIa and IIb) Process - Validation (Steps IIa and IIb) Summary - Usability Assessment	9	34 35 36 37

QAPP Worksheet #1: Title and Approval Page

Title: Site-Specific Quality Assurance Project Plan
Site Name/Project Name: Superior Barrel and Drum Site
Site Location: 798 Jacob Harris Road, Elk Township, Gloucester County, New Jersey
Revision Number: 00
Revision Date: Not Applicable

Weston Solutions, Inc.
Lead Organization

Patrick Ahern
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1090 King Georges Post Road, Suite 201
Edison, NJ 08837
Email: Patrick.Ahern@westonsolutions.com
Preparer's Name and Organizational Affiliation

May 1, 2014
Preparation Date (Day/Month/Year)

Site Project Manager: _____
Signature

Peter Lisichenko/Weston Solutions, Inc.
Printed Name/Organization/Date

QA Officer/Technical Reviewer: _____
Signature

Smita Sumbaly/Weston Solutions, Inc.
Printed Name/Organization/Date

EPA, Region II On-Scene Coordinator (OSC): _____
Signature

Keith Glenn/EPA, Region II
Printed Name/Organization/Date

EPA, Region II Quality Assurance Officer (QAO): _____
Signature

Printed Name/Organization/Date

Document Control Number: RST 2-02-F-2782

QAPP Worksheet #2: QAPP Identifying Information

Site Name/Project Name: Superior Barrel and Drum Site
Site Location: 798 Jacob Harris Road, Elk Township, Gloucester County, New Jersey
Operable Unit: 00
Title: Site Quality Assurance Project Plan
Revision Number: 00
Revision Date: Not Applicable

1. Identify guidance used to prepare QAPP: Uniform Federal Policy for Quality Assurance Project Plans. Refer to EPA/ERT SOPs and DESA Laboratory Methods
2. **Identify regulatory program:** EPA, Region II
3. **Identify approval entity:** EPA, Region II
4. **Indicate whether the QAPP is a generic or a Site-specific QAPP.**
5. **List dates of scoping sessions that were held:** March 28 and April 24, 2014
6. **List dates and titles of QAPP documents written for previous site work, if applicable:**

   Site Specific Quality Assurance Project Plan (QAPP), Superior Barrel and Drum, RST 2-02-F-2541, September 6, 2013

7. **List organizational partners (stakeholders) and connection with lead organization:** None
8. **List data users:** EPA, Region II (see Worksheet #4 for individuals)
9. **If any required QAPP elements and required information are not applicable to the project, then provide an explanation for their exclusion below:** None
10. **Document Control Number:** RST 2-02-F-2782

QAPP Worksheet #3: Distribution List

[List those entities to which copies of the approved QAPP, subsequent QAPP revisions, addenda, and amendments are sent]

QAPP Recipient	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
Keith Glenn	OSC	EPA, Region II	(732) 452-6415	(732) 906-6182	Glenn.keith@epa.gov	RST 2-02-F-2782
Timothy Benton	HSO	Weston Solutions, Inc., RST 2	(732) 585-4425	(732) 225-7037	Tim.Benton@westonsolutions.com	RST 2-02-F-2782
Smita Sumbaly	QA Officer	Weston Solutions, Inc., RST 2	(732) 585-4410	(732) 225-7037	S.Sumbaly@westonsolutions.com	RST 2-02-F-2782
Peter Lisichenko	SPM	Weston Solutions, Inc., RST 2	(732)-585-4411	(732) 225-7037	Peter.Lisichenko@westonsolutions.com	RST 2-02-F-2782

QAPP Worksheet #4: Project Personnel Sign-Off Sheet

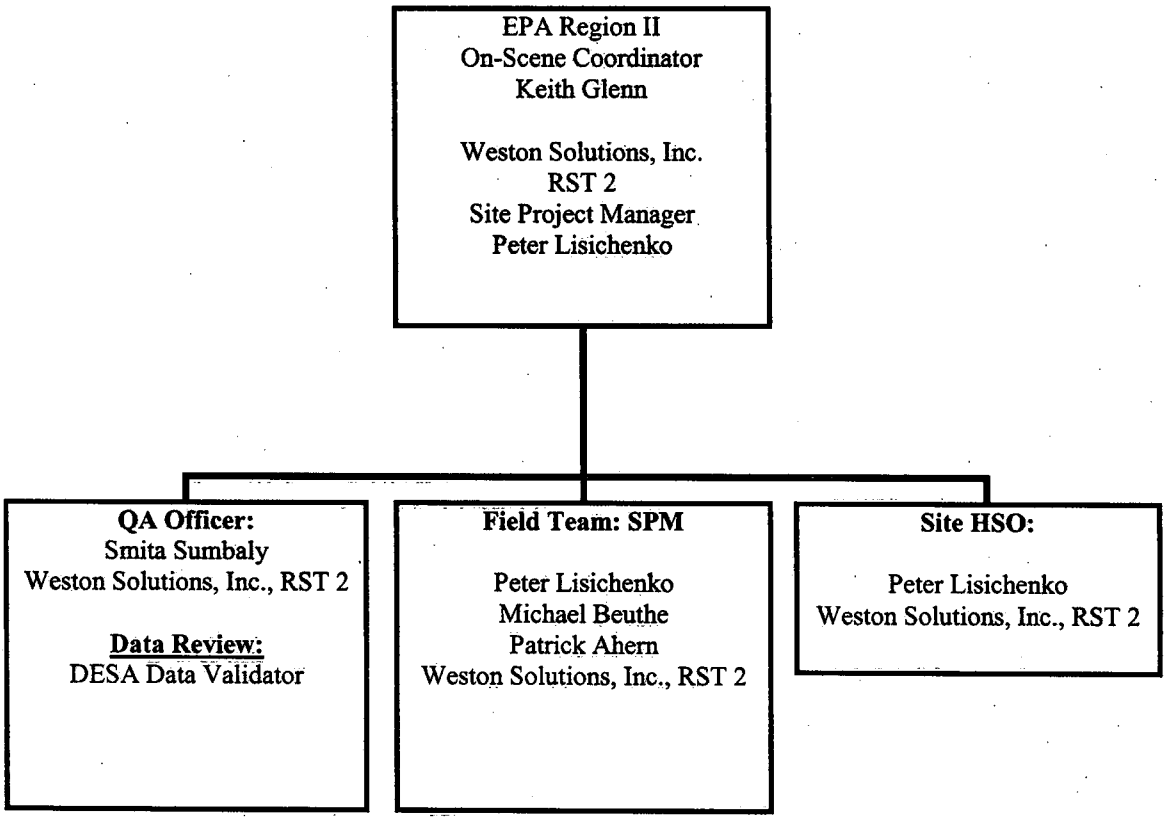
[Copies of this form signed by key project personnel from each organization to indicate that they have read the applicable sections of the QAPP and will perform the tasks as described; add additional sheets as required. Ask each organization to forward signed sheets to the central project file.]

Organization: Weston Solutions, Inc.

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Keith Glenn	EPA, Region II, On-Scene Coordinator	(732) 321-4454		
Peter Lisichenko	Site Project Manager, RST 2	(732) 585-4411		5/1/14
Smita Sumbaly	QAO, RST 2	(732) 585-4410		5/1/14
Timothy Benton	HSO, RST 2	(732) 585-4425		5/1/14
Michael Beuthe	Field Personnel, RST 2	(732) 585-4447		
Patrick Ahern	Field Personnel, RST 2	(732) 585-4448		

QAPP Worksheet #5: Project Organizational Chart

Identify reporting relationship between all organizations involved in the project, including the lead organization and all contractor and subcontractor organizations. Identify the organizations providing field sampling, on-site and off-site analysis, and data review services, including the names and telephone numbers of all project managers, project team members, and/or project contacts for each organization.



Acronyms:

SPM: Site Project Manager
HSO: Health & Safety Officer
DESA: Division of Environmental Science and Assessment

QAPP Worksheet #6: Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure
Point of contact with EPA OSC	Site Project Manager, Weston Solutions, Inc., RST 2	Peter Lisichenko, SPM	(732) 585-4411	All technical, QA and decision-making matters in regard to the project (verbal, written or electronic)
Adjustments to QAPP	Site Project Manager, Weston Solutions, Inc., RST 2	Peter Lisichenko, SPM	(732) 585-4411	QAPP approval dialogue
Health and Safety On-Site Meeting	Site Project Manager, Weston Solutions, Inc., RST 2	Peter Lisichenko, SPM	(732) 585-4411	Explain Site hazards, personnel protective equipment, hospital location, etc.

OSC: On-Scene Coordinator
SPM: Site Project Manager

QAPP Worksheet #7: Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications*
Keith Glenn	EPA On-Scene Coordinator	EPA, Region 2	All project coordination, direction and decision making.	NA
Peter Lisichenko, SPM	Site Project Manager, RST 2	Weston Solutions, Inc.	Implementing and executing the technical, QA and health and safety during sampling event and sample management.	13 years*
Michael Beuthe	Field Personnel, RST 2	Weston Solutions, Inc.	Sample collection	3 years*
Patrick Ahern	Field Personnel, RST 2	Weston Solutions, Inc.	Sample collection	3 years*

*All RST 2 members, including subcontractor's resumes are in possession of RST 2 Program Manager, EPA Project Officer and Contracting officers.

QAPP Worksheet #8: Special Personnel Training Requirements Table

Project Function	Specialized Training By Title or Description of Course	Training Provider	Training Date	Personnel / Groups Receiving Training	Personnel Titles / Organizational Affiliation	Location of Training Records / Certificates[1]
[Specify location of training records and certificates for samplers]						
QAPP Training	This training is presented to all RST 2 personnel to introduce the provisions, requirements, and responsibilities detailed in the UFP QAPP. The training presents the relationship between the site-specific QA Project Plans (QAPPs), SOPs, work plans, and the Generic QAPP. QAPP refresher training will be presented to all employees following a major QAPP revision.	Weston Solutions, Inc., QAO	As needed	All RST 2 field personnel upon initial employment and as refresher training	Weston Solutions, Inc.	Weston Solutions, Inc., EHS Database
Health and Safety Training	Health and safety training will be provided to ensure compliance with Occupational Safety and Health Administration (OSHA) as established in 29 CFR 1910.120.	Weston Solutions, Inc., HSO	Yearly at a minimum	All Employees upon initial employment and as refresher training every year	Weston Solutions, Inc.	Weston Solutions, Inc., EHS Database
Others	FORMS II Lite, Scribe, ICS 100 and 200, and Air Monitoring Equipment Trainings provided to all employees	Weston Solutions, Inc., QAO/Group Leader's	Upon initial employment and as needed			
	Dangerous Goods Shipping	Weston Solutions, Inc., HSO	Every 2 years			

All team members are trained in the concepts and procedures in recognizing opportunities for continual improvement, and the approaches required to improve procedures while maintaining conformance with legal, technical, and contractual obligations.

[1] All RST 2 members, including subcontractor's certifications are in possession of RST 2 HSO.

QAPP Worksheet #9: Project Scoping Session Participants Sheet

Site Name/Project Name: Superior Barrel and Drum Site
Site Location: 798 Jacob Harris Road, Elk Township, Gloucester County, New Jersey
Operable Unit: 00
Date of Session: March 28 and April 24, 2014
Scoping Session Purpose: To discuss questions, comments, and assumptions regarding technical issues involved with the sampling activities.

Name	Title	Affiliation	Phone #	E-mail Address	*Project Role
Keith Glenn	On-Scene Coordinator	EPA, Region II	(732) 452-6415	Glenn.keith@epa.gov	OSC
Peter Lisichenko	Site Project Manager	Weston Solutions, Inc., RST 2	(732) 585-4411	Peter.Lisichenko@westonsolutions.com	Site Project Management

Comments/Decisions: As part of the Removal Assessment, Weston Solutions, Inc., Removal Support Team 2 (RST 2) is tasked by the EPA to sample sediments located at both on-site and off-site locations, including wetland areas. Twenty Sediment samples will be collected via plastic scoops and En Core volumetric sampling devices. Samples will be submitted to the EPA DESA laboratory for (TCL) volatile organic compounds (VOC), semi-volatile organic compound (SVOC), polychlorinated biphenyl (PCB), pesticides, target analyte list (TAL) metal, mercury, and cyanide analyses. The samples will be collected for definitive data QA objectives. One field duplicate sample and additional volume for MS/MSD samples will be collected. One trip blank sample will be included in the sample cooler for the first set of samples collected.

Action Items: RST 2 Submitted a CLP request form for analytical services on April 24, 2014. Analytical services request approval was received on April 28, 2014 for EPA DESA laboratory.

Consensus Decisions: Sampling conducted as part of the Removal Assessment will begin on May 5, 2014 and last approximately for two days

QAPP Worksheet #10: Problem Definition

PROBLEM DEFINITION

Based up on New Jersey Department of Environmental Protection's (NJDEP) observations from August 2013 and subsequent observations by EPA; thousands of containers, mostly 275-gallon totes and 55-gallon drums, located along the road as well as in the woods, wetlands, and elsewhere throughout the Site. Containers were shown to be various states of deterioration. They were found to be leaking, void of tops, exposed to weather elements, rusted, damaged due to gunshots, stored improperly, and laying on their sides. Numerous trailers were also found to be open and containing 55-gallon drums. The containers throughout the Site appeared to be full of contents, however most did not have labels. Labels on some containers include flammable liquids, corrosive, marine pollutant, flammable solid and non-hazardous material. Based on NJDEP's field screening, the materials did not reflect the labels on the containers for many of drums. Solid and Liquid Waste sampling was conducted by Weston Solutions, Inc., RST 2 as part of the 2013 Removal Assessment of the Site. The analytical data was used to determine the presence and nature of the contaminants at the Site. As a follow up to the 2013 sampling event, sediment sampling will be conducted by Weston Solutions, Inc., RST 2 at wetland areas located both on-site and the adjoining property. Sampling is scheduled to commence on May 5, 2014 and is anticipated to be completed in two days.

SITE HISTORY/CONDITIONS

The Site is located at 798 Jacob Harris Road in Elk Township, Gloucester County, New Jersey (coordinates 39.6869, -75.132314). The facility consists of a main processing building and numerous trailers located throughout the 5.5 acre property. North of the Site is bordered by Industrial Drum Company and a chain-link fence separates the two properties. Jacob Harris Road marks the eastern boundary of the Site, beyond which is a densely forested property. To the South are private lands which are also densely wooded with several marshy areas. The Western boundary is indicated by Rt. 55, a major highway. Currently, the facility is inoperable with last known operation activity occurring in 2012. The Site is unsecured from each direction and evidence of trespassers has been noted. All doors of the main building and trailers are open.

The Site consists of two operational areas. The main area is where the permanent steel structure is located. This area would receive containers, rinse the containers, and recondition them for future market. This area is approximately 2.4 acres with containers located throughout. The additional operational area appears to be mainly storage of full 275-gallon and 55-gallon totes, with several trailers holding containers. This area encompasses approximately 0.32 acres of land, also holding hundreds of totes and drums. Both areas show signs of impact from leaking containers or dumping of materials.

EPA conducted a Removal Assessment at the Site in September 2013. Waste samples were collected from the drums, tanks, and other containers on site, as well as surface water and soil samples. Samples were screened in the field by EPA's Emergency and Rapid Response Services (ERRS) contractor using a HazCat field screening kit. Field screening results indicated that many of these contained housed hazardous materials, including flammables and corrosives. More than 100 of these samples were sent to a laboratory for target compound list (TCL) VOC, semi-

QAPP Worksheet #10: Problem Definition (Concluded)

volatile organic compound (SVOC), polychlorinated biphenyl (PCB), pesticide, target analyte list (TAL) metal, mercury, and cyanide analyses. Resulting from this sampling indicated high levels of VOCs and SVOCs within many of the containers, as well as pesticides and PCBs in some of the containers. Results also indicated that contamination of some of the on-site soils had occurred.

PROJECT DESCRIPTION

In order to assist EPA with the assessment activities, RST 2 is tasked with the collection of 20 sediment samples from on-site and adjoining wetland areas. The sediment sampling will start on May 5, 2014 and conclude on May 6, 2014. Samples will be collected along four transects located both on and off the subject site with approximately five samples taken from each. Samples will be submitted to the EPA DESA laboratory for (TCL) volatile organic compounds (VOC), semi-volatile organic compound (SVOC), polychlorinated biphenyl (PCB), pesticides, target analyte list (TAL) metal, mercury, and cyanide analyses. The samples will be collected for definitive data QA objectives. One field duplicate sample and additional volume for MS/MSD samples will be collected. One trip blank sample will be included in the sample cooler for the first set of samples collected.

PROJECT DECISION STATEMENTS

The analytical data from this investigation will be used to assist the EPA in determining the presence and nature of the contaminants at the Site and the adjoining Freshwater Forested/Shrub Wetlands.

QAPP Worksheet # 11: Project Quality Objectives/Systematic Planning Process Statement

Overall project objectives include: RST 2 is tasked with the collection of 20 sediment samples from on-site and adjoining wetland areas. The sediment sampling will start on May 5, 2014 and conclude on May 6, 2014. Samples will be collected along four transects located both on and off the subject site with approximately five samples taken from each. Samples will be submitted to the EPA DESA laboratory for (TCL) volatile organic compound (VOC), semi-volatile organic compound (SVOC), polychlorinated biphenyl (PCB), pesticides, target analyte list (TAL) metal, mercury, and cyanide analyses. The samples will be collected for definitive data QA objectives. One field duplicate sample and additional volume for MS/MSD samples will be collected. One trip blank sample will be included in the sample cooler for the first set of samples collected. The analytical data from this investigation will be used to assist the EPA in determining the presence and nature of the contaminants at the Site and the adjoining Freshwater Forested/Shrub Wetlands.

Who will use the data? Data and field screening characterization will be used by the EPA, Region II OSC.

What will the data be used for? Data from this sampling event will be used to determine the presence of the contaminants in wetland areas located on and off-site

What types of data are needed?
Matrix: Sediment
Type of Data: Definitive data
Analytical Techniques: Off-site laboratory analyses
Parameters: Full TCL (VOCs, SVOCs, pesticides, and PCBs); and TAL metals, including mercury and cyanide
Type of sampling equipment: Sample jars, En Core Samplers, plastic scoops, aluminum pie tins, and zip-lock bags
Access Agreement: Obtained by EPA, Region II OSC
Sampling locations: Sampling will be done along three parallel transects that start near the central portion of the site and extend south/southeast beyond the property boundary and into the adjoining wetland areas. A fourth separate sampling transect line will be located offsite, southeast of the subject property.

How much data are needed? Twenty sediment samples will be collected from the sampling transects located both on and offsite. Approximately 5 samples will be collected from each transect line. Samples will be submitted to the EPA DESA laboratory for (TCL) volatile organic compound (VOC), semi-volatile organic compound (SVOC), polychlorinated biphenyl (PCB), pesticides, target analyte list (TAL) metal, mercury, and cyanide analyses. The samples will be collected for definitive data QA objectives. One field duplicate sample and additional volume for MS/MSD samples will be collected. One trip blank sample will be included in the sample cooler for the first set of samples collected.

How "good" does the data need to be in order to support the environmental decision?
Sampling/analytical measurement performance criteria for Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCC) parameters will be established. Refer to Worksheet #12, criteria for performance measurement for definitive data.

QAPP Worksheet # 11: Project Quality Objectives/Systematic Planning Process Statement (Concluded)

Where, when, and how should the data be collected/generated? Sample locations will be selected by EPA OSC along the designated transect lines to determine overall condition of the wetland areas located on Site and on adjoining property. All samples will be collected utilizing methods outlined in the Standard Operating Procedures (SOPs). GPS data for all sample locations will be collected. The Removal Assessment is scheduled to begin on May 5, 2014 and will last approximately two days.

Who will collect and generate the data? The sediment samples will be collected by RST 2 and analyzed by EPA DESA laboratory for VOC, SVOC, TAL-metals (including mercury and cyanide), pesticides and PCB analyses. The results obtained will be validated by EPA DESA data validators.

How will the data be reported? All data will be reported by the assigned laboratories (Preliminary, Electronics, and Hard Copy format). The Site Project Manager will provide a Sampling Trip Report, Status Reports, Maps/Figures, Analytical Report, and Data Validation Report to the EPA OSC.

How will the data be archived? Electronic data deliverables will be archived in the Scribe database.

QAPP Worksheet #12: Measurement Performance Criteria Table
Worksheet # 12A: Volatile - Organics (DESA)

Matrix	Sediment/Aqueous[1]
Analytical Group	VOA
Concentration Level	Medium

Sampling Procedure	Analytical Method/SOP[3]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP 2016	See worksheets #28/ #23	Precision Accuracy	% RPD < 20 Average Recovery 70-130%	LCS Duplicate	A
		Accuracy	Factor of two(-50% to + 100%) from the initial/continuing calibration	Internal standards	A
		Accuracy	Compound Specific (full range: 17-259%)	Matrix spike	A
		Accuracy	Limits 70%-130%(Aqueous) Table 7 of C-123(low Soil)	Surrogate Compounds	A
		Accuracy	< RL	Method Blank	A

SOP – Sample Operating Procedure
[1] Aqueous sample will consist of a trip blank sample only. Aqueous field duplicate and MS/MSD will not be collected

QAPP Worksheet #12: Measurement Performance Criteria Table (Continued)
Worksheet # 12B: Semivolatile - Organics (DESA)

Matrix	Sediment
Analytical Group[1]	Semi-Volatiles
Concentration Level	Medium

Sampling Procedure[2]	Analytical Method/SOP[3]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP 2016	See worksheet #28 & #23	Precision Accuracy	% RPD < 30 Compound Specific (full range: D-262%)	LCS Duplicate	A
		Accuracy	Factor of two(-50% to + 100%) from the initial/continuing calibration	Internal standards	A
		Accuracy	Compound Specific (full range: D-262%)	Matrix spike	A
		Accuracy	Limits 30%-120% for Base Neutrals Limits 20%-120% for Acids	Surrogate Compounds	A
		Accuracy	< RL	Method Blank	A

SOP – Sample Operating Procedure

QAPP Worksheet #12 Measurement Performance Criteria Table (Continued)
Worksheet # 12C: Pesticides/PCB – Organics (DESA)

Matrix	Sediment
Analytical Group[1]	Pest/PCB
Concentration Level	Medium

Sampling Procedure[2]	Analytical Method/SOP[3]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP 2016	See worksheets #28/ #23	Precision Accuracy	% RPD < 30 Average Recovery 50-150%	LCS Duplicate	A
		Accuracy	Compound Specific (full range: 30-150%)	Matrix spike	A
		Accuracy	Limits 30%-150%	Surrogate Compounds	A
		Accuracy	< RL	Method Blank	A

SOP – Sample Operating Procedure

QAPP Worksheet #12 Measurement Performance Criteria Table (Continued)
Worksheet # 12D: TAL Metals - Inorganics (DESA)

Matrix	Sediment
Analytical Group	Metals/Mercury/Cyanide
Concentration Level	Medium

Sampling Procedure[2]	Analytical Method/SOP[3]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP 2016	See #28/ #23	Precision	% RPD < 20(Aq), % RPD <25(Soil)	LCS Duplicate	A
		Accuracy	Limits: Average Recovery ± 20% aqueous, ± 25% Soil)	LCS	A
		Accuracy	± 20% aqueous, ± 25% Soil)	Matrix spike	A
		Precision	< RL Except for Al, Fe, Ca, K, Mg and Na	Interference Check Sample(ICP/AES)	A
		Accuracy	< RL	Method Blank	A
		Precision	RPD < 20 %	Serial Dilution Test(ICP/AES)	A
		Accuracy	Range of 0.60-1.87 of the original response in the calibration blank	Internal Standards(ICP-MS)	A

SOP – Sample Operating Procedure

QAPP Worksheet #13: Secondary Data Criteria and Limitations Table

Any data needed for project implementation or decision making that are obtained from non-direct measurement sources such as computer databases, background information, technologies and methods, environmental indicator data, publications, photographs, topographical maps, literature files and historical data bases will be compared to the DQOs for the project to determine the acceptability of the data. Thus, for example, analytical data from historical surveys will be evaluated to determine whether they satisfy the validation criteria for the project and to determine whether sufficient data was provided to allow an appropriate validation to be done. If not, then a decision to conduct additional sampling for the site may be necessary.

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data May Be Used (if deemed usable during data assessment stage)	Limitations on Data Use
UFP HASP, October 2013	RST 2 Site - Specific HASP, Superior Barrel and Drum Final Trip Report	Weston Solutions, Inc.	Data used to confirm soil contamination.	N/A

QAPP Worksheet #14: Summary of Project Tasks

Sampling Tasks:

As part of the Removal Assessment, Weston Solutions, Inc., Removal Support Team 2 (RST 2) is tasked with the collection of 20 sediment samples from on-site and adjoining wetland areas. The sediment sampling will start on May 5, 2014 and conclude on May 6, 2014. Samples will be collected along four transects located both on and off the subject site with approximately five samples taken from each. Samples will be submitted to the EPA DESA laboratory for (TCL) volatile organic compound (VOC), semi-volatile organic compound (SVOC), polychlorinated biphenyl (PCB), pesticides, target analyte list (TAL) metal, mercury, and cyanide analyses. The samples will be collected for definitive data QA objectives. One field duplicate sample and additional volume for MS/MSD samples will be collected. One trip blank sample will be included in the sample cooler for the first set of samples collected. The analytical data from this investigation will be used to assist the EPA in determining the presence and nature of the contaminants at the Site and the adjoining Freshwater Forested/Shrub Wetlands.

Analysis Tasks:

Sediment – TCL VOCs – DESA Method C-123
Sediment – TCL SVOCs – DESA Method C-90
Sediment – TCL PCBs – DESA Method C-91
Sediment – TCL Pesticides – DESA Method C-91
Sediment – TAL Metals (including mercury and Cyanide) – DESA Method C-109, C-110, and C-28

Quality Control Tasks:

All samples will be collected for Definitive Data QA Objective. QA/QC samples will include the collection of one field duplicate for sediment samples, and any additional volume for MS/MSD at the ratio of 1 per 20 samples and 1 per matrix.

Data Management Tasks:

Activities under this project will be reported in status and trip reports and other deliverables (e.g., analytical reports, final reports) described herein. Activities will also be summarized in appropriate format for inclusion in monthly and annual reports.

The following deliverables will be provided under this project:

Maps/Figures: Maps depicting site layout and sample locations will be included in the final report.

QAPP Worksheet #14: Summary of Project Tasks (Continued)

Analytical Report: An analytical report will be prepared for samples analyzed under this plan. Information regarding the analytical methods or procedures employed, sample results, QA/QC results, chain-of-custody documentation, laboratory correspondence, and raw data will be provided within this deliverable.

Data Review: A review of the data generated under this plan will be undertaken. The assessment of data acceptability or usability will be provided separately, or as part of the analytical report.

Final Report: A final report will be prepared which will include a description of field activities, analysis of laboratory results and field data, a sample location map, photo log, and data tables.

Documentation and Records:
All sample documents will be completed legibly, in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error.

Field Logbook: The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. Field logbook will be bound and paginated. All entries will be dated and signed by the individuals making the entries, and should include (at a minimum) the following:

1. Site name and project number
2. Name(s) of personnel on-site
3. Dates and times of all entries (military time preferred)
4. Descriptions of all site activities, site entry and exit times
5. Noteworthy events and discussions
6. Weather conditions
7. Site observations
8. Sample and sample location identification and description*
9. Subcontractor information and names of on-site personnel
10. Date and time of sample collections, along with chain of custody information
11. Record of photographs
12. Site sketches

* The description of the sample location will be noted in such a manner as to allow the reader to reproduce the location in the field at a later date.

Sample Labels: Sample labels will clearly identify the particular sample, and should include the following:

1. Site/project number.
2. Sample identification number.
3. Sample collection date and time.
4. Designation of sample (grab or composite).
5. Sample preservation.
6. Analytical parameters.
7. Name of sampler.

QAPP Worksheet #14: Summary of Project Tasks (Concluded)

Sample labels will be written in indelible ink and securely affixed to the sample container. Tie-on labels can be used if properly secured.

Custody Seals: Custody seals demonstrate that a sample container has not been tampered with or opened. The individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, will be noted in the field logbook.

Assessment/Audit Tasks:

No performance audit of field operations is anticipated at this time. If conducted, performance and system audit will be in accordance with the project plan.

Data Review Tasks:

All data will be validated by the DESA Laboratory Data Validators.

Laboratory analytical results will be assessed by the data reviewer for compliance with required precision, accuracy, completeness, representativeness, and sensitivity.

QAPP Worksheet #15A
Reference Limits and Evaluation Table

Matrix: Aqueous (Trip Blank)
Analytical Group: Target Compound List Volatile Organic Compounds
Concentration Level: Medium

Analyte	CAS Number	Project (PRP) Quantitation Limit	Method QLs	Achievable Laboratory (DESA) Limits	
				MDLs µg/kg	RLs µg/kg
Dichlorodifluoromethane	75-71-8	NS	5 µg/L	0.3	5 µg/L
Chloromethane	74-87-3	NS	5 µg/L	0.54	5 µg/L
Vinyl Chloride	75-01-4	NS	5 µg/L	1.52	5 µg/L
Bromomethane	74-83-9	NS	5 µg/L	1.90	5 µg/L
Chloroethane	75-00-3	NS	5 µg/L	1.01	5 µg/L
Trichlorofluoromethane	75-69-4	NS	5 µg/L	2.18	5 µg/L
1,1-Dichloroethene	75-35-4	NS	5 µg/L	1.12	5 µg/L
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NS	5 µg/L	0.3	5 µg/L
Carbon Disulfide	75-15-0	NS	5 µg/L	1.58	5 µg/L
Acetone	67-64-1	NS	10 µg/L	0.67	10 µg/L
Methyl Acetate	79-20-9	NS	5 µg/L	0.4	5 µg/L
Methylene Chloride	75-09-2	NS	5 µg/L	0.52	5 µg/L
trans-1,2-Dichloroethene	156-60-5	NS	5 µg/L	0.91	5 µg/L
cis-1,2-Dichloroethene	156-59-2	NS	5 µg/L	0.2	5 µg/L
Methyl tert-Butyl Ether	1634-04-4	NS	5 µg/L	0.4	5 µg/L
1,1-Dichloroethane	75-34-3	NS	5 µg/L	0.58	5 µg/L
2-Butanone	78-93-3	NS	10 µg/L	0.7	10 µg/L
Chloroform	67-66-3	NS	5 µg/L	0.44	5 µg/L
1,2-Dichloroethane	107-06-2	NS	5 µg/L	0.55	5 µg/L
1,1,1-Trichloroethane	71-55-6	NS	5 µg/L	0.6	5 µg/L
Cyclohexane	110-82-7	NS	5 µg/L	0.6	5 µg/L
Carbon Tetrachloride	56-23-5	NS	5 µg/L	1.23	5 µg/L
Benzene	71-43-2	NS	5 µg/L	0.46	5 µg/L
Trichloroethene	79-01-6	NS	5 µg/L	0.99	5 µg/L
Methylcyclohexane	108-87-2	NS	5 µg/L	0.7	5 µg/L
1,2-Dichloropropane	78-87-5	NS	5 µg/L	0.44	5 µg/L
Bromodichloromethane	75-27-4	NS	5 µg/L	0.51	5 µg/L
cis-1,3-Dichloropropene	10061-01-5	NS	5 µg/L	0.63	5 µg/L
trans-1,3-Dichloropropene	10061-02-6	NS	5 µg/L	0.4	5 µg/L
1,1,2-Trichloroethane	79-00-5	NS	5 µg/L	0.3	5 µg/L
Dibromochloromethane	124-48-1	NS	5 µg/L	0.2	5 µg/L
4-Methyl-2-Pentanone	108-10-1	NS	10 µg/L	0.64	10 µg/L
Toluene	108-88-3	NS	5 µg/L	0.77	5 µg/L
1,2-Dibromoethane	106-93-4	NS	5 µg/L	0.2	5 µg/L

QAPP Worksheet #15A
Reference Limits and Evaluation Table (Concluded)

Matrix: Aqueous (Trip Blank)
Analytical Group: Target Compound List Volatile Organic Compounds – Concluded
Concentration Level: Medium

Analyte	CAS Number	Project (PRP) Quantitation Limit	Method CRQL µg/kg	Achievable Laboratory (DESA) Limits MDLs µg/kg	RLs µg/kg
Chlorobenzene	108-90-7	NS	5 µg/L	0.59	5 µg/L
Tetrachloroethene	127-18-4	NS	5 µg/L	1.11	5 µg/L
2-Hexanone	591-78-6	NS	10 µg/L	0.68	10 µg/L
Ethylbenzene	100-41-4	NS	5 µg/L	0.59	5 µg/L
m,p-Xylene	179601-23-1	NS	5 µg/L	1.17	5 µg/L
o-Xylene	95-47-6	NS	5 µg/L	0.56	5 µg/L
Styrene	100-42-5	NS	5 µg/L	0.57	5 µg/L
Bromoform	75-25-2	NS	5 µg/L	0.43	5 µg/L
Isopropylbenzene	98-82-8	NS	5 µg/L	0.3	5 µg/L
1,1,2,2-Tetrachloroethane	79-34-5	NS	5 µg/L	0.64	5 µg/L
1,3-Dichlorobenzene	541-73-1	NS	5 µg/L	0.82	5 µg/L
1,4-Dichlorobenzene	106-46-7	NS	5 µg/L	0.84	5 µg/L
1,2-Dichlorobenzene	95-50-1	NS	5 µg/L	0.75	5 µg/L
1,2-Dibromo-3-Chloropropane	96-12-8	NS	5 µg/L	0.7	5 µg/L
1,2,4-Trichlorobenzene	120-82-1	NS	5 µg/L	0.4	5 µg/L
*1,2,3-Trichlorobenzene	87-61-6	NS	5 µg/L		5 µg/L
* Bromochloromethane	74-97-5	NS	5 µg/L		5 µg/L

NS – Not Specified
* MDL study will be performed.

QAPP Worksheet #15B
Reference Limits and Evaluation Table

Matrix: Sediment

Analytical Group: Volatile Organic Compounds

Concentration Level: Medium

Analyte	CAS Number	Project (PRP) Quantitation Limit	Method CRQL µg/kg	Achievable Laboratory (DESA) Limits MDLs µg/kg	RLs µg/kg
Dichlorodifluoromethane	75-71-8	NS	250	NA	250
Chloromethane	74-87-3	NS	250	NA	250
Vinyl Chloride	75-01-4	NS	250	NA	250
Bromomethane	74-83-9	NS	250	NA	250
Chloroethane	75-00-3	NS	250	NA	250
Trichlorofluoromethane	75-69-4	NS	250	NA	250
1,1-Dichloroethene	75-35-4	NS	250	NA	250
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NS	250	NA	250
Carbon Disulfide	75-15-0	NS	250	NA	250
Acetone	67-64-1	NS	500	NA	500
Methyl Acetate	79-20-9	NS	250	NA	250
Methylene Chloride	75-09-2	NS	250	NA	250
trans-1,2-Dichloroethene	156-60-5	NS	250	NA	250
cis-1,2-Dichloroethene	156-59-2	NS	250	NA	250
Methyl tert-Butyl Ether	1634-04-4	NS	250	NA	250
1,1-Dichloroethane	75-34-3	NS	250	NA	250
2-Butanone	78-93-3	NS	500	NA	500
Chloroform	67-66-3	NS	250	NA	250
1,2-Dichloroethane	107-06-2	NS	250	NA	250
1,1,1-Trichloroethane	71-55-6	NS	250	NA	250
Cyclohexane	110-82-7	NS	250	NA	250
Carbon Tetrachloride	56-23-5	NS	250	NA	250
Benzene	71-43-2	NS	250	NA	250
Trichloroethene	79-01-6	NS	250	NA	250
Methylcyclohexane	108-87-2	NS	250	NA	250
1,2-Dichloropropane	78-87-5	NS	250	NA	250
Bromodichloromethane	75-27-4	NS	250	NA	250
cis-1,3-Dichloropropene	10061-01-5	NS	250	NA	250
trans-1,3-Dichloropropene	10061-02-6	NS	250	NA	250
1,1,2-Trichloroethane	79-00-5	NS	250	NA	250
Dibromochloromethane	124-48-1	NS	250	NA	250
4-Methyl-2-Pentanone	108-10-1	NS	500	NA	500
Toluene	108-88-3	NS	250	NA	250

NS – Not Specified

NA – Not Applicable

QAPP Worksheet #15B
Reference Limits and Evaluation Table (Concluded)

Matrix: Sediment

Analytical Group: Volatile Organic Compounds

Concentration Level: Medium

Analyte	CAS Number	Project (PRP) Quantitation Limit	Method CRQL µg/kg	Achievable Laboratory (DESA) Limits MDLs µg/kg	RLs µg/kg
1,2-Dibromoethane	106-93-4	NS	250	NA	250
Chlorobenzene	108-90-7	NS	250	NA	250
Tetrachloroethene	127-18-4	NS	250	NA	250
2-Hexanone	591-78-6	NS	500	NA	500
Ethylbenzene	100-41-4	NS	250	NA	250
m,p-Xylene	179601-23-1	NS	250	NA	250
o-Xylene	95-47-6	NS	250	NA	250
Styrene	100-42-5	NS	250	NA	250
Bromoform	75-25-2	NS	250	NA	250
Isopropylbenzene	98-82-8	NS	250	NA	250
1,1,2,2-Tetrachloroethane	79-34-5	NS	250	NA	250
1,3-Dichlorobenzene	541-73-1	NS	250	NA	250
1,4-Dichlorobenzene	106-46-7	NS	250	NA	250
1,2-Dichlorobenzene	95-50-1	NS	250	NA	250
1,2-Dibromo-3-Chloropropane	96-12-8	NS	250	NA	250
1,2,4-Trichlorobenzene	120-82-1	NS	250	NA	250
1,2,3-Trichlorobenzene	87-61-6	NS	250	NA	250
Bromochloromethane	74-97-5	NS	250	NA	250

Note: Based on the new CRQLs the MDL study is currently being reanalyzed.

NS – Not Specified

NA – Not Applicable

QAPP Worksheet #15C
Reference Limits and Evaluation Table

Matrix: Sediment
Analytical Group: Semi -Volatile Organic Compounds
Concentration Level: Low/Medium

Analyte	CAS Number	Project (PRP) Quantitation Limit [3]	Method QLs µg/kg	Achievable Laboratory (DESA) Limits MDLs µg/kg	RLs µg/kg
Benzaldehyde	100-52-7	NS	170	NA	120
Phenol	108-95-2	NS	170	NA	120
Bis(2-Chloroethyl)Ether	111-44-4	NS	170	NA	120
2-Chlorophenol	95-57-8	NS	170	NA	120
2-Methylphenol	95-48-7	NS	170	NA	120
Bis(2-Chloroisopropyl)Ether	108-60-1	NS	170	NA	120
Acetophenone	98-86-2	NS	170	NA	120
4-Methylphenol	106-44-5	NS	170	NA	120
N-Nitroso-Di-N-Propylamine	621-64-7	NS	170	NA	120
Hexachloroethane	67-72-1	NS	170	NA	120
Nitrobenzene	98-95-3	NS	170	NA	120
Isophorone	78-59-1	NS	170	NA	120
2-Nitrophenol	88-75-5	NS	170	NA	120
2,4-Dimethylphenol	105-67-9	NS	170	NA	120
Bis(2-Chloroethoxy)Methane	111-91-1	NS	170	NA	120
2,4-Dichlorophenol	120-83-2	NS	170	NA	120
Naphthalene	91-20-3	NS	170	NA	120
4-Chloroaniline	106-47-8	NS	170	NA	120
Hexachlorobutadiene	87-68-3	NS	170	NA	120
Caprolactam	105-60-2	NS	170	NA	120
4-Chloro-3-Methylphenol	59-50-7	NS	170	NA	120
2-Methyl Naphthalene	91-57-6	NS	170	NA	120
Hexachlorocyclopentadiene	77-47-4	NS	170	NA	120
1,2,4,5-Tetrachlorobenzene	95-94-3	NS	170	NA	120
2,4,6-Trichlorophenol	88-06-2	NS	170	NA	120
2,4,5-Trichlorphenol	95-95-4	NS	170	NA	120
1,1'-Biphenyl	92-52-4	NS	170	NA	120
2-Chloronaphthalene	91-58-7	NS	170	NA	120
2-Nitroaniline	88-74-4	NS	330	NA	120
Dimethyl Phthalate	131-11-3	NS	170	NA	120
Acenaphthylene	208-96-8	NS	170	NA	120
2,6-Dinitrotoluene	606-20-2	NS	170	NA	120
3-Nitroaniline	99-09-2	NS	330	NA	120
Acenaphthene	83-32-9	NS	170	NA	120
2,4-Dinitrophenol	51-28-5	NS	330	NA	800
4-Nitrophenol	100-02-7	NS	330	NA	400
Dibenzofuran	132-64-9	NS	170	NA	120
2,4-Dinitrotoluene	121-14-2	NS	170	NA	120
2,3,4,6-Tetrachlorophenol	58-90-2	NS	170	NA	120

QAPP Worksheet #15C (Concluded)
Reference Limits and Evaluation Table

Matrix: Sediment
Analytical Group: Semi -Volatile Organic Compounds
Concentration Level: Medium

Analyte	CAS Number	Project (PRP) Quantitation Limit [3]	Method QLs [5] µg/kg	Achievable Laboratory (DESA) Limits MDLs µg/kg	RLs µg/kg
Fluorene	86-73-7	NS	170	NA	120
Diethylphthalate	84-66-2	NS	170	NA	120
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	170	NA	120
4-Nitroaniline	100-01-6	NS	330	NA	120
4,6-Dinitro-2-Methylphenol	534-52-1	NS	330	NA	400
N-Nitrosodiphenylamine	86-30-6	NS	170	NA	120
4-Bromophenyl Phenyl Ether	101-55-3	NS	170	NA	120
Hexachlorobenzene	118-74-1	NS	170	NA	120
Atrazine	1912-24-9	NS	170	NA	120
Pentachlorophenol	87-86-5	NS	330	NA	400
Phenanthrene	85-01-8	NS	170	NA	120
Anthracene	120-12-7	NS	170	NA	120
Carbazole	86-74-8	NS	170	NA	120
Di-N-Butyl Phthalate	84-74-2	NS	170	NA	120
Fluoranthene	206-44-0	NS	170	NA	120
Pyrene	129-00-0	NS	170	NA	120
Butylbenzylphthalate	85-68-7	NS	170	NA	120
3,3-Dichlorobenzidine	91-94-1	NS	170	NA	120
Benzo(A)Anthracene	56-55-3	NS	170	NA	120
Chrysene	218-01-9	NS	170	NA	120
Bis(2-Ethylhexyl)Phthalate	117-81-7	NS	170	NA	120
Di-N-Octyl Phthalate	117-84-0	NS	170	NA	120
Benzo(B)Fluoranthene	205-99-2	NS	170	NA	120
Benzo(K)Fluoranthene	207-08-9	NS	170	NA	120
Benzo(A)Pyrene	50-32-8	NS	170	NA	120
Indeno(1,2,3-Cd)Pyrene	193-39-5	NS	170	NA	120
Dibenzo(A,H)Anthrcene	53-70-6-3	NS	170	NA	120
Benzo(G,H,I)Perylene	191-24-2	NS	170	NA	120
1,4-Dioxane	-	NS	-	NA	-

Note: Based on the new CRQLs the MDL study is currently being reanalyzed.
NS – Not Specified
NA – Not applicable

QAPP Worksheet #15D
Reference Limits and Evaluation Table

Matrix: Sediment
Analytical Group: PEST/PCBs
Concentration Level: Medium

Analyte	CAS Number	Project (PRP) Quantitation Limit [3]	Method QLs µg/kg	Achievable Laboratory (DESA) Limits MDLs µg/kg	RLs µg/kg
alpha-BHC	319-89-6	NS	1.7	2.15	2.5
gamma-BHC	58-89-9	NS	1.7	1.89	2.5
beta-BHC	319-85-7	NS	1.7	1.35	2.5
delta-BHC	319-86-8	NS	1.7	1.51	2.5
Heptachlor	76-44-8	NS	1.7	2.05	2.5
Aldrin	309-00-2	NS	1.7	1.66	2.5
Heptachlor Epoxide	1024-57-3	NS	1.7	1.34	2.5
Gamma-Chlordane	5103-74-2	NS	1.7	0.96	2.5
Alpha-Chlordane	5103-71-9	NS	1.7	1.01	2.5
Endosulfan I	1031-07-8	NS	1.7	1.16	2.5
4,4'-DDE	72-55-9	NS	3.3	1.92	5.0
Dieldrin	60-57-1	NS	3.3	1.91	5.0
Endrin	72-20-8	NS	3.3	1.84	5.0
4,4'-DDD	72-54-8	NS	3.3	1.35	5.0
Endosulfan Ii	1031-078	NS	3.3	1.27	5.0
4,4'-DDT	50-29-3	NS	3.3	1.52	5.0
Endrin Aldehyde	7421-93-4	NS	3.3	2.24	5.0
Methoxychlor	72-43-5	NS	17	8.00	25
Endosulfan Sulfate	1031-07-8	NS	3.3	1.24	2.5
Endrin Ketone	53494-70-5	NS	3.3	1.18	2.5
Toxaphene	8001-35-2	NS	170	75.9	190
Technical Chlordane		NS	NS	56.1	62
AROCLOR 1016	12674-11-2	NS	33	NS	31
AROCLOR 1221	11104-28-2	NS	33	NS	62
AROCLOR 1232	11141-16-5	NS	33	NS	31
AROCLOR 1242	53469-21-9	NS	33	29.9	31
AROCLOR 1248	12672-29-6	NS	33	NS	31
AROCLOR 1254	11097-69-1	NS	33	NS	31
AROCLOR 1260	11096-82-5	NS	33	NS	31
AROCLOR 1262	37324-23-5	NS	33	NS	31
AROCLOR 1268	11100-14-4	NS	33	NS	31

NS- Not Specified

QAPP Worksheet #15E
Reference Limits and Evaluation Table

Matrix: Sediment
Analytical Group: Metals
Concentration Level: Medium

Analyte	CAS Number	Project (PRP) Quantitation Limit [3]	Method CRQLs mg/kg	Achievable Laboratory (DESA) Limits MDLs mg/kg	RLs mg/kg
Aluminum	7429-90-5	NS	20	*	100
Antimony	7440-36-0	NS	6	0.22	2
Arsenic	7440-38-2	NS	1	0.35	0.8
Barium	7440-39-3	NS	20	0.24	10
Beryillum	7440-41-7	NS	0.5	0.02	0.3
Cadmium	7440-43-9	NS	0.5	0.02	0.3
Calcium	7440-70-2	NS	500	12.57	50
Chromium	7440-47-3	NS	1	0.34	0.5
Cobalt	7440-48-4	NS	5	0.03	2
Copper	7440-50-8	NS	2.5	0.26	1
Iron	7439-89-6	NS	10	*	5
Lead	7439-92-1	NS	1	0.23	0.8
Magnesium	7439-95-4	NS	500	5.06	50
Manganese	7439-96-5	NS	1.5	0.33	0.5
Mercury	7439-97-6	NS	0.1	.0043	0.05
Nickel	7440-02-0	NS	4	0.09	2
Potassium	7440-09-7	NS	500	12.36	50
Selenium	7782-49-2	NS	3.5	0.22	2
Silver	7440-22-4	NS	1	0.06	0.5
Sodium	7440-23-5	NS	500	22.48	100
Thallium	7440-28-0	NS	2.5	3.14	2
Vanadium	7440-62-2	NS	5	0.40	2
Zinc	7440-66-6	NS	6	1.57	2
Cyanide	57-12-5	NS	NA	NA	NA

* MDL study cannot be successfully performed on these analytes because of high background levels in matrix (sand).
NS- Not Specified

QAPP Worksheet #16: Project Schedule/Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Preparation of QAPP	RST 2 Contractor Site Project Manager	Prior to sampling date	4/29/2014	QAPP	4/30/2014
Review of QAPP	RST 2 Contractor QAO and/or Group Leader	Prior to sampling date	4/30/2014	Approved QAPP	5/1/2014
Preparation of Health and Safety Plan	RST 2 Contractor Site Project Manager	Prior to sampling date	4/29/2014	HASP	4/30/2014
Procurement of Field Equipment	RST 2 Contractor Site Project Manager and/or Equipment Officer	Prior to sampling date	–	NA	NA
Laboratory Request	RST 2 Contractor Site Project Manager and/or QAO	Prior to sampling date	4/24/2014	CLP Request Forms	NA
Field Reconnaissance/Access	RST 2 Contractor Site Project Manager; or EPA Region 2 OSC	NA	NA	NA	NA
Collection of Field Samples	RST 2 Contractor Site Project Manager	5/5/2014	5/6/2014	NA	NA
Laboratory Electronic Data Received	EPA Region 2 DESA	14 Days After Sampling	14 Days After Sampling	Preliminary Data	14 Days After Sampling
Laboratory Package Received	EPA Region 2 DESA	21 Days After Sampling	21 Days After Sampling	Validated Data	5/28/2014
Validation of Laboratory Results	EPA Region 2 DESA	42 Days After Sampling	42 Days After Sampling	Final Report	6/18/2014
Data Evaluation/ Preparation of Final Report	RST 2 Contractor Site Project Manager	6/18/2014	6/30/2014	Final Report	6/30/2014

QAPP Worksheet #17: Sampling Design and Rationale

RST 2 is tasked with the collection of sediment samples which will be collected from both on-site and off-site locations, including wetland areas. Sediment sampling activities will be conducted in accordance with guidelines outlined in EPA/ERT Soil Sampling SOP #2016. Sediment samples will be collected from downstream locations first and continue moving upstream so that the downstream locations are not impacted by the disturbance of sediment form upstream locations. Sediment samples will be collected at up to 20 locations utilizing disposable sampling equipment eliminating the need for equipment decontamination. TCL VOCs samples will be immediately collected utilizing Encore samplers. Then, other sediment samples will be collected with a spatula or sterile scoops and homogenized in a stainless steel bowl or pie pans. The homogenized samples will be placed in glass sample jars for TCL SVOC, PCB, pesticide, TAL Metal, including mercury and cyanide, analyses. Rocks and other debris will be removed from each sample to ensure sufficient sample volume prior to placing it into a jar. Samples must be shipped to the laboratory at the end of each day to meet the required holding time for Encore samples.

The following laboratories will provide the analyses indicated:

Lab Name/Location	Sample Type	Parameters
EPA Region 2 DESA Laboratory 2890 Woodbridge Ave. Bldg. 209, MS-230 Edison, New Jersey 08837	Sediment	TCL-VOC, TCL-SVOC, TAL-metals (including mercury and cyanide), PCBS, Pesticides

Refer to Worksheet #20 for QA/QC samples, sampling methods and SOP.

QAPP Worksheet #18: Sampling Locations and Methods/SOP Requirements Table

Matrix	Sampling Location(s)	Units	Analytical Group(s)	Concentration Level	No. of Samples (identify field duplicates)	Sampling SOP Reference	Rationale for Sampling Location
Sediment	Approximately 5 samples per designated transect lines	mg/kg	TCL-VOCs, TCL-SVOCs, PCBs, Pesticides, and TAL Metals (including mercury & cyanide),	Low to Medium	Up to 20 (1 field duplicate)	SOP#2016	Characterize current sediment conditions in on-site and adjoining wetland areas.

The website for EPA-ERT SOPs is: http://www.ert.org/mainContent.asp?section=Products&subsection=List

QAPP Worksheet #19: Analytical SOP Requirements Table

Matrix	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
Sediment	TCL Volatiles + Percent Moisture	Low- Medium	C-123 (*Ref:* SOM01.1)	1 x 100g or 4 X Encore Same(QC) and 1 4oz Glass Jar	Glass, wide mouth jar or Encore samplers	Cool, 4°C or Frozen (-10 to -14)	48 hours
Sediment	TCL Semi-Volatiles	Low	C-90 *(Ref: EPA 625)*	1 x 250g 1 x 250g(QC)	Glass, wide mouth	Cool, 4°C	To extraction: 14 days;40 days to analysis
Sediment	Pesticides/PCBs	Low	C-91 *(Ref: EPA 608)*	1 x 100g 1 x 100g(QC)	Glass, wide mouth	Cool, 4°C	To extraction: 14 days;40 days to analysis
Sediment	TAL Metals/Mercury and Cyanide	Low	C-109 *(Ref: EPA 200.7)* C- 110 *(Ref: EPA 245.1)*	1 X 250ml 1 X 250ml(QC)	Rigid Plastic	Cool, 4°C	6 months Hg-28days CN – 14 days

Additional volumes will be collected for MS/MSD analysis for soil matrix.

QAPP Worksheet #20: Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC (e.g., MS/MSD) Samples	No. of Rinsate Blanks	No. of Trip. Blanks	Total No. of Samples to Lab
Sediment	TCL VOC	Medium	DESA C-123, C-89	Approx. 5 per Transect (4 transects total)	1/20 samples per matrix	1/20 samples per matrix	NR	1	21
	TCL SVOC	Medium	DESA C-90			1/20 samples per matrix	NR	NR	
	TAL Metals + Mg and CN	Medium	DESA C-109, C-116, C-28			1/20 samples per matrix	NR	NR	
	Pesticides/PCBS	Medium	DESA C-91			1/20 samples per matrix	NR	NR	

Additional volume will be collected for MS/MSD Analysis.
NR – Not Required

QAPP Worksheet #21: Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
SOP#2001	General Field Sampling Guidelines	EPA/OSWER/ERT	Flags, disposable plastic scoops, En Core volumetric sampling device	N	--
SOP #2016	Sediment Sampling from Compendium of ERT Surface Water and Sediment Sampling Procedures January 1991	EPA/OSWER/ERT	Flags, disposable plastic scoops, En Core volumetric sampling device	N	20 Sediment Samples from on-site and off-site wetlands

See attachment B for SOPs. Note: The website for EPA-ERT SOPs is: www.ert.org/mainContent.asp?section=Products&subsection=List

QAPP Worksheet #22: Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
MultiRAE Plus Incl. PID	Calibrate with Zero Air; LEL: 2.5% (50% LEL) O_2: 18% H_2S: 10 ppm CO: 50 ppm PID: 100 ppm Isobutylene	Check/ replace battery/ Clean tip or bulb if necessary	Bump Test	Prior to day's activities; anytime anomaly suspected	LEL: 48-52% LEL (2% LEL) O_2: 17-19% (1%) H_2S: 9-11 ppm (1 ppm) CO: 48-52 ppm (2 ppm) PID: 95-105 ppm Isobutylene (5 ppm)	Replace battery or Replace Unit	Equipment Vendor	--
Trimble® GeoXT™ handheld								

QAPP Worksheet #23: Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
C-28	Cyanides, Total, Rev 2.0, 3/07	Definite	Cyanide	AutoAnalyzer	DESA LAB	N
C-89	Analysis of Volatile Organic Compounds in Aqueous, Soil/Sediment and Waste Oil/Waste Organic Solvents Samples by Purge and Trap GC/MS, Rev 2.0, 3/07	Definite	TCL Volatiles (Aqueous)	GC-MS	DESA LAB	N
C-123	Analysis of Volatile Organic Compounds by Automated Closed System by Purge and Trap GC/MS, Rev 2.0, 3/07	Definite	TCL Volatiles(Low Soil)	GC-MS	DESA LAB	N
C-90	Analysis of Base/Neutral and Acid Compounds in Aqueous, Soil/Sediment and Waste Oil/Waste Organic Solvent Samples, Rev 2.0, 3/07	Definite	TCL Semi-Volatiles	GC-MS	DESA LAB	N
C-91	Analysis of Pesticides and PCBs in Aqueous, Soil/Sediments and Waste Oil/Transformer Fluid Matrices, Rev 2.0, 3/07	Definite	Pesticides/PCBs	GC-ECD	DESA LAB	N
C-109	Determination of Trace Elements in Aqueous Trace Metals in Aqueous, Soil/Sediment/Sludge-ICP-AES, Rev 2.0, 3/07	Definite	TAL Metals	ICP-AES	DESA LAB	N
C-110	Mercury Analysis in Water and Soil/Sediments By CVAAS, Rev 2.0, 3/07	Definite	Mercury	CVAA	DESA LAB	N

QAPP Worksheet #24: Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
ICP-AES	See SOP C-109	See SOP C-109	See SOP C-109	See SOP C-109	Assigned Lab personnel	SOP C-109
CVAAS	See SOP C-110	See SOP C-110	See SOP C-110	See SOP C-110	Assigned Lab personnel	SOP C-110
Colorimetric/Auto Analyzer	See SOP C-28 Per manufacture's manual	See SOP C-28	See SOP C-28	See SOP C-28	Assigned Lab personnel	SOP C-28
GC-ECD	See SOP C-91	See SOP C-91	See SOP C-91	See SOP C-91	Assigned Lab personnel	SOP C-91
GC-MS	See SOP C- 90, C-89	See SOP C- 90, C-89	See SOP C- 90, C-89	See SOP C- 90, C-89	Assigned Lab personnel	SOP C- 90, C-89

QAPP Worksheet #25: Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

DESA Laboratory

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
See list of Instrument given in Worksheet #24	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19

[1]Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).

QAPP Worksheet #26: Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): RST 2 Site Project Manager, Weston Solutions, Inc., Region II
Sample Packaging (Personnel/Organization): RST 2 Site Project Manager and sampling team members, Weston Solutions, Inc., Region II
Coordination of Shipment (Personnel/Organization): RST 2 Site Project Manager, sampling team members, Weston Solutions, Inc., Region II
Type of Shipment/Carrier: FedEx and/ or hand-delivery.
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization):): Sample Custodian, DESA Laboratories
Sample Custody and Storage (Personnel/Organization): Sample Custodian, DESA Laboratories
Sample Preparation (Personnel/Organization): Sample Technicians, DESA Laboratory
Sample Determinative Analysis (Personnel/Organization): Sample Technicians, DESA Laboratories
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples to be shipped on day of collection, and arrive at laboratory within 24 hours (1 day) of sample shipment.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): As per analytical methodology; see Worksheet #19.
Biological Sample Storage (No. of days from sample collection): N/A
SAMPLE DISPOSAL
Personnel/Organization: Sample Technicians, DESA Laboratories
Number of Days from Analysis: Until analysis and QA/QC checks are completed; as per analytical methodology; see Worksheet #19.

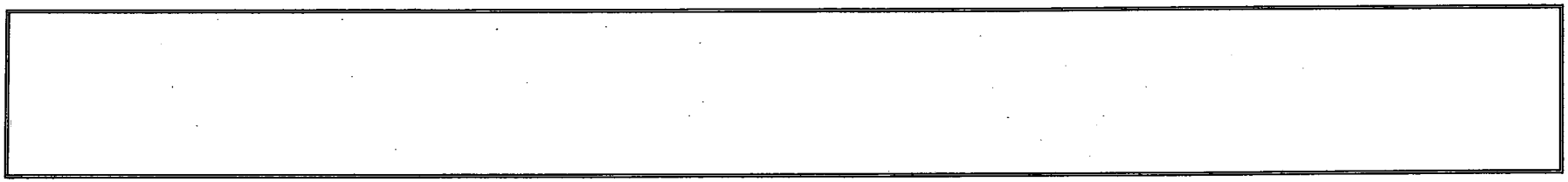
QAPP Worksheet #27: Sample Custody Requirements

Sample Identification Procedures: Each sample collected by Region II RST 2 will be identified by a property location number, the matrix of the sample collected, sample location number, the sample number, and sample type. The matrix identifier for sediment will be SD. The last number will represent the sample type (normal or duplicate). Normal samples will be identified with a 01, duplicate samples will be designated 02. The Trip blank sample will be identified by a six digit number comprised of the corresponding year, month ,and day (YYMMDD).

e.g. P001-SD001-001-01 – Property 001, Sediment- Sample Location 001, sample number 001, sample type 01.
TB-140501 – Trip Blank from May 1, 2014

Location of the sample collected will be recorded in the project database and site logbook. A duplicate sample will be identified in the same manner as other samples and will be distinguished and documented in the field logbook. Each sample will also be labeled with a non-CLP assigned number. Depending on the type of sample, additional information such as sampling round, date, etc. will be added.

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, then sealed with custody seals and enclosed in a plastic cooler. The sample information will be recorded on chain-of custody (COC) forms, and the samples FedEx and/or hand delivered to the appropriate laboratory by RST 2. Chain-of-custody records must be prepared in Scribe database for all CLP samples to accompany samples from the time of collection and throughout the shipping process. Each individual in possession of the samples must sign and date the sample COC Record. The chain-of-custody record will be considered completed upon receipt at the laboratory. A traffic report and chain-of-custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples are not under direct control of the not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. Specific information regarding custody of the samples projected to be collected on the weekend will be noted in the field logbook.



QAPP Worksheet #27: Sample Custody Requirements (Concluded)

The chain-of-custody record should include (at minimum) the following: 1) Sample identification number; 2) Sample information; 3) Sample location; 4) Sample date; 5) Sample Time; 6) Sample Type Matrix; 7) Sample Container Type; 8) Sample Analysis Requested; 9) Name(s) and signature(s) of sampler(s); and 10) Signature(s) of any individual(s) with custody of samples. A separate chain-of-custody form must accompany each cooler for each daily shipment. The chain-of-custody form must address all samples in that cooler, but not address samples in any other cooler. This practice maintains the chain-of-custody for all samples in case of mis-shipment.

Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal): A sample custodian at the laboratory will accept custody of the shipped samples, and check them for discrepancies, proper preservation, integrity, etc. If noted, issues will be forwarded to the laboratory manager for corrective action. The sample custodian will relinquish custody to the appropriate department for analysis. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

Note: Refer to Contract Laboratory Program Guidance for Field Samplers, EPA-540-R-07-06, January 2011 at:
http://www.epa.gov/superfund/programs/clp/download/sampler/clp_sampler_guidance.pdf

QAPP Worksheet # 28A
QC Samples Table
Volatile Organic Compounds (DESA)

Matrix	Sediment/Aqueous
Analytical Group	VOC
Concentration Level	Low/Medium
Sampling SOP	ERT SOP 2016
Analytical Method/ SOP Reference	C-89/C-123 (Ref: EPA 624)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Tuning	12 hr period	Pass all PBFB tune criteria	Check Instrument Reanalyze, Retune	Lab personnel	Sensitivity	Pass all PBFB tune criteria
Initial Calibration	SOP C-89	% RSD +/- 35% Not more than 10% of total analytes failure % RSD not more than 60%	Check Instrument, Reanalyze	Lab personnel	Accuracy/ Precision	% RSD +/- 35% Not more than 10% of total analytes failure % RSD not more than 60%
Continuing Calibration Check Standard (Alternate check standard)	1 per analytical batch of 20 samples	Max %D RRF +/- 30% Not more than 10% of total analytes failure % D not more than 60%	Reanalyze, Qualify data	Lab personnel	Accuracy	Max %D RRF +/- 30% Not more than 10% of total analytes failure % D not more than 60%
Method Blank	1 per extraction batch of 20 samples	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL

QAPP Worksheet #28A (Concluded)
QC Samples Table
Volatile Organic Compounds (DESA)

Matrix	Sediment/Aqueous[1]
Analytical Group	VOC
Concentration Level	Low/Medium
Sampling SOP	ERT SOP 2016
Analytical Method/ SOP Reference	C-89/C-123 (Ref: EPA 624)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Trip Blank	1 in cooler containing first set of VOC samples	Client Defined	Investigate source of contamination	Lab personnel	Sensitivity Contamination	
LCS/LFB	2 per extraction batch of 20 samples	Limits: Average Recovery 70-130% % RPD < 20	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy/ Precision	Limits: Average Recovery 70-130% % RPD < 20
Laboratory Matrix spikes	1 per extraction batch of 20 samples	Table 4 of C-89 compound specific (full range- 17-259%)	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy	Table 4 of C-89 compound specific (full range- 17-259%)
Internal Standards	Each sample, standard, blank	Factor of two(-50% to + 100%) from the initial/continuing calibration	Check Instrument Analyse / Qualify data	Lab personnel	Quantitation	Factor of two(-50% to + 100%) from the initial/continuing calibration
Surrogates	Each sample, standard, blank	Limits 70%-130%	Reinject, Qualify data	Lab personnel	Extraction efficiency, Accuracy	Limits 70%-130%

SOP – Sample Operating Procedure
[1] Aqueous sample will consist of trip blank sample only. Aqueous field duplicate and MS/MSD will not be collected

QAPP Worksheet #28B

QC Samples Table
TCL Semivolatile Organic Compounds (DESA)

Matrix	Sediment
Analytical Group	SVOC
Concentration Level	Medium
Sampling SOP	ERT SOP 2016
Analytical Method/ SOP Reference	C-90 (Ref: EPA 625)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Tuning	12 hr period	Pass all DFTPP tune criteria	Check Instrument Reanalyze, Retune	Lab personnel	Sensitivity	Pass all DFTPP tune criteria
Initial Calibration	SOP C-90	% RSD +/- 35% Allowed to fail 10% of total number of analytes but % RSD not be more than 60%	Check Instrument, Reanalyze	Lab personnel	Accuracy/ Precision	% RSD +/- 35% Allowed to fail 10% of total number of analytes but % RSD not be more than 60%
Continuing Calibration Check Standard (Alternate check standard)	1 per analytical batch of ≤20 samples	Min RRF 0.05 Max %D +/- 20% 10% of total analytes allowed to fail but not more than 60%	Reanalyze, Qualify data	Lab personnel	Accuracy	Min RRF 0.05 Max %D RRF +/- 20% 10% of total analytes allowed to fail but not more than 60%
Method Blank	1 per extraction batch of ≤20 samples	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL

QAPP Worksheet #28B (Concluded)
QC Samples Table
TCL Semivolatile Organic Compounds (DESA)

Matrix	Sediment
Analytical Group	SVOC
Concentration Level	Medium
Sampling SOP	ERT SOP 2016
Analytical Method/ SOP Reference	C-90 (Ref: EPA 625)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS/LFB	2 per extraction batch of ≤20 samples	Limits listed in Table3 in SOP C-90 for aqueous, manufacture's limits for soil % RPD < 30	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy/ Precision	Limits listed in Table3 in SOP C-90 for aqueous, manufacture's limits for soil % RPD < 30
Laboratory Matrix spikes	1 per extraction batch of ≤20 samples	Limits listed in Table3 in SOP C-90	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy	Limits listed in Table3 in SOP C-90
Internal Standards	Each sample, standard, blank	Factor of two (-50% to -100%)	Check Instrument Analyse / Qualify data	Lab personnel	Quantitation	Factor of two (-50% to -100%)
Surrogates	Each sample, standard, blank	30%-120% for Base Neutrals 20-120% for Acids	Reinject, Qualify data as per SOP C-90	Lab personnel	Extraction efficiency, Accuracy	30%-120% for Base Neutrals 20-120% for Acids

SOP – Sample Operating Procedure

QAPP Worksheet #28C
QC Samples Table
TCL PCBs and Pesticides (DESA)

Matrix	Sediment
Analytical Group	Pesticides/PCBs
Concentration Level	Medium
Sampling SOP	ERT SOP 2016
Analytical Method/ SOP Reference	C-91 (Ref: EPA 608)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrument Performance (PEM)	Beginning of each analytical run	Total breakdown <30%	Check Instrument	Lab personnel	Sensitivity Contamination	Total breakdown <30%
Initial Calibration	C-91 (Ref: EPA 608)	% RSD +/- 25% Not more than 10% of total analytes failure RSD not more than 30%	Check Instrument, Reanalyze	Lab personnel	Accuracy/ Precision	% RSD +/- 25% Not more than 10% of total analytes failure RSD not more than 30%
Continuing Calibration Check Standard (Alternate check standard)	Beginning and the end of each analytical run	Max %D RRF +/- 25%	Reanalyze, Qualify data	Lab personnel	Accuracy	Max %D RRF +/- 25%
Method Blank	1 per extraction batch	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL

QAPP Worksheet #28C (Concluded)
QC Samples Table
TCL PCBs and Pesticides (DESA)

Matrix	Sediment
Analytical Group	Pesticides/PCBs
Concentration Level	Medium
Sampling SOP	ERT SOP 2016
Analytical Method/ SOP Reference	C-91 (Ref: EPA 608)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS/LFB	2 per extraction batch	Limits: Average Recovery 50-150% % RPD < 30	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy/ Precision	Limits: Average Recovery 50-150% % RPD < 30
Laboratory Matrix spikes	1 per extraction batch	Limits 30-150%	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy	Limits 30-150%
Surrogates	Each sample, standard, blank	Limits 30%-150%	Reinject, Qualify data	Lab personnel	Extraction efficiency, Accuracy	Limits 30%-150%

SOP – Sample Operating Procedure.

QAPP Worksheet #28D
QC Samples Table
TAL Metals including Mercury and Cyanide (DESA)

Matrix	Sediment
Analytical Group	Metals + Mercury and Cyanide
Concentration Level	Low/Medium
Sampling SOP	2016
Analytical Method/ SOP Reference	C-109,C-112, C-110, C-28 (Ref: EPA 200.7, 200.8, 245.1)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Tuning/System Stability(ICP-MS)	As per C-112	Pass all the tune/stability criteria	Check Instrument Reanalyze, Retune	Lab personnel	Sensitivity	Pass all the tune/stability criteria
Initial Calibration Verification	Immediately following each calibration ,after every 10 samples and at the end of each analytical run	90%-110%	Check Instrument, Reanalyze	Lab personnel	Accuracy	90%-110%
Continuing Calibration Check Standard (Alternate check standard)	Every 10 samples and at the end of each analytical run	80%-120%	Reanalyze, Qualify data	Lab personnel	Accuracy	80%-120%
Initial Calibration Blank(ICB)	After ICV	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL

QAPP Worksheet #28D (Continued)
QC Samples Table
TAL Metals including Mercury and Cyanide

Matrix	Sediment
Analytical Group	Metals + Mercury and Cyanide
Concentration Level	Low/Medium
Sampling SOP	2016
Analytical Method/ SOP Reference	C-109,C-112, C-110, C-28 (Ref: EPA 200.7, 200.8, 245.1)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Continuing Calibration Blank(CCB)	After every CCV	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
Low Level Check Standard	At Beginning and end of each analytical run	± 30% of the true value	Check Instrument, Re-calibrate	Lab personnel	Accuracy	± 30% of the true value
Interference Check Sample(ICP-200.7)	At Beginning and end of each analytical run	< RL Except Al ,Fe, Ca, K, Mg and Na	As per C-109	Lab personnel	Precision	< RL Except Al ,Fe, Ca, K, Mg and Na
Method blank	1 per extraction batch of ≤20 samples	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
LCS/LFB	2 per extraction batch of ≤20 samples	Limits: Average Recovery ± 20% aqueous, ± 25% Soil) % RPD < 20(Aq), % RPD <25(Soil)	Qualify data	Lab personnel	Accuracy/ Precision	Limits: Average Recovery ± 20% aqueous, ± 25% Solids) % RPD < 20(Aq), % RPD <25(Soil

QAPP Worksheet #28D (Concluded)
QC Samples Table
TAL Metals including Mercury and Cyanide

Matrix	Sediment
Analytical Group	Metals + Mercury and Cyanide
Concentration Level	Low/Medium
Sampling SOP	2016
Analytical Method/ SOP Reference	C-109,C-112, C-110, C-28 (Ref: EPA 200.7, 200.8, 245.1)
Sampler's Name	Peter Lisichenko
Field Sampling Organization	Weston Solutions
Analytical Organization	USEPA Region 2 Lab
No. of Sample Locations	Approx. 5 per Transect (4 Transects total)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Matrix spikes	1 per extraction batch of ≤20 samples	Limits ± 20% aqueous, ± 25% Soil)	Qualify data	Lab personnel	Accuracy	Limits ± 20% aqueous, ± 25% Soil)
Serial Dilution Test(ICP-200.7)	Matrix spike sample	RPD < 20 %	Qualify data	Lab personnel	Precision	RPD < 20 %
Internal Standards(ICP-MS 200.8)	Each sample, standard, blank	Range of 0.60-1.87 of the original response in the calibration blank	Check Instrument Analyse / Qualify data	Lab personnel	Quantitation	Range of 0.60-1.87 of the original response in the calibration blank

SOP – Sample Operating Procedure.

QAPP Worksheet #29: Project Documents and Records Table

Sample Collection Documents and Records	Analysis Documents and Records	Data Assessment Documents and Records	Other
• Site and field logbooks • COC forms • Field Data Sheets • GIS map for sampling locations • Incident Action plan	• Sample receipt logs • Internal and external COC forms • Equipment calibration logs • Sample preparation worksheets/logs • Sample analysis worksheets/run logs • Telephone/email logs • Corrective action documentation	• Data validation reports • Field inspection checklist(s) • Laboratory Audit checklist (if performed) • Review forms for electronic entry of data into database • Corrective action documentation • Laboratory Final Data	• CLP Request Form

QAPP Worksheet #30: Analytical Services Table

Matrix	Analytical Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Sediment	TCL VOCs	Medium	DESA C-123	3 weeks written	EPA Region 2 DESA Laboratory 2890 Woodbridge Ave. Bldg. 209, MS-230 Edison, New Jersey 08837 John Birri 732-906-6886	NA
	TCL SVOCs	Medium	DESA C-90	3 weeks written		NA
	TAL Metals, Hg and CN	Medium	DESA C 109, C-110, C-28	3 weeks written		NA
	Pesticides/PCBs	Medium	DESA C-91	3 weeks written		NA

Note: Aqueous Trip Blank Sample will be collected for TCL VOC Analysis Only.

QAPP Worksheet #31: Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
DESA Laboratory							
PT	Semiannually	External	NELAC	PT provider	Lab Personnel	Lab Personnel	Lab QA Officer
NELAC	Every two years	External	NELAC	Florida DOH	Lab QA Officer	Lab Personnel	Florida DOH
INTERNAL AUDIT	Monthly	Internally	DESA Lab	Lab QA Officer	Lab Personnel	Lab Personnel	Lab QA Officer

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Project Readiness Review	Checklist or logbook entry summary	Site Project Manager, Weston Solutions, Inc.	Immediately to within 24 hours of review	Checklist or logbook entry	Site Project Manager, Weston Solutions, Inc.	Immediately to within 24 hours of review
Field Observations/ Deviations from Work Plan	Logbook	Site Project Manager, Weston Solutions, Inc. and EPA RPM	Immediately to within 24 hours of deviation	Logbook	Site Project Manager, Weston Solutions, Inc. and EPA RPM	Immediately to within 24 hours of deviation
Laboratory Technical Systems/ Performance Audits	Written Report	DESA Laboratory	30 days	Letter	DESA Laboratory	14 days
On-Site Field Inspection	Written Report	Site Project Manager, Weston Solutions, Inc.	7 calendar days after completion of the audit	Letter/Internal Memorandum	Site Project Manager, Weston Solutions, Inc. and/or EPA RPM	To be identified in the cover letter of the report
Performance Evaluation Samples	Electronic Report	DESA Laboratory	30 days	Letter or Written Report	DESA Laboratory	14 days
Peer Review	Deliverables	SPM, Weston Solutions, Inc.	Prior to deliverable due date	Comments directly on deliverable	SPM, Weston Solutions, Inc.	Prior to deliverable due date

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
EPA-DESA Laboratory	As performed	Up to 60 days after receipt of unvalidated data	EPA Region 2	Keith Glenn, EPA OSC, Region 2 and Site Project Manager, Weston Solutions, Inc.
EPA-DESA Laboratory (preliminary)	As performed	2 weeks from the sampling date	EPA DESA Laboratory	Keith Glenn, EPA OSC, Region 2 and Site Project Manager, Weston Solutions, Inc.
EPA-DESA Laboratory (validated)	As performed	Up to 21 days after receipt of preliminary data	EPA Region II DESA & ESAT Data Validators	RST 2 SPM, Weston Solutions, Inc., and OSC, EPA Region II
On-Site Field Inspection	As performed	7 calendar days after completion of the inspection	RST 2 HSO	RST 2 SPM, Weston Solutions, Inc.
Field Change Request	As required per field change	3 days after identification of need for field change	RST 2 SPM	Keith Glenn EPA OSC
Final Report	As performed	2 weeks after receipt of EPA approval of data package	RST 2 SPM	Keith Glenn EPA OSC

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	[1]Responsible for Verification (Name, Organization)
Site/field logbooks	Field notes will be prepared daily by the RST 2 Site Project Manager and will be complete, appropriate, legible and pertinent. Upon completion of field work, logbooks will be placed in the project files.	I	Site Project Manager, Weston Solutions, Inc.
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to shipment. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	Site Project Manager, Weston Solutions, Inc.
Sampling Trip Reports	STRs will be prepared for each week of field sampling [for which samples are sent to EPA's DESA laboratory.] Information in the STR will be reviewed against the COC forms, and potential discrepancies will be discussed with field personnel to verify locations, dates, etc.	I	Site Project Manager, Weston Solutions, Inc.
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	E	EPA DESA Laboratory
Laboratory analytical data package	Data packages will be reviewed as to content and sample information upon receipt by EPA.	I	DESA Data Validation Personnel
Final Sample Report	The project data results will be compiled in a sample report for the project. Entries will be reviewed/verified against hardcopy information.	I	Site Project Manager, Weston Solutions, Inc.

[1] Responsible for verifications, and their name and organization will be added

QAPP Worksheet #34
Verification (Step I) Process Table (Concluded)

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
EPA DESA Laboratory			
Chain of Custody	Chain-of-custody forms will be verified against the sample cooler they represent. Sample Acceptance Checklist is completed. The OSCAR staff supervisor utilizes the analyses request information and the external COC to review the accuracy and completeness of LIMS log-in entries, as reflected on the LIMS Sample Receipt Form Details can be found in Laboratory Quality Management Plan, SOP G-25	I	OSCAR Personnel DESA LAB
Analytical data package/ Final Report	The procedures for data review : 1- Data reduction/review by Primary Analyst. 2- Review complete data package (raw data) by independent Peer Reviewer 3- The Sample Project Coordinator reviews the project documentation for completeness followed by a QA review by the QAO 4- Final review by Branch Chief/Section Chief prior to release, this review is to ensure completeness and general compliance with the objectives of the project. This final review typically does not include a review of raw data. Details can be found in Laboratory Quality Management Plan.	I	Primary Analyst, Peer Reviewer, Sample Project Coordinator, Quality Assurance Officer, Section Chief/ Branch Chief. DESA LAB

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	RST 2 Site Project Manager
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	RST 2 Site Project Manager
EPA DESA Laboratory			
	Chain of Custody	Chain-of-custody forms will be verified against the sample cooler they represent. Sample Acceptance Checklist is completed. The OSCAR staff supervisor utilizes the analyses request information and the external COC to review the accuracy and completeness of LIMS log-in entries, as reflected on the LIMS Sample Receipt Form Details can be found in Laboratory Quality Management Plan, SOP G-25	OSCAR Personnel DESA LAB
	Analytical data package/ Final Report	The procedures for data review : 1- Data reduction/review by Primary Analyst. 2- Review complete data package (raw data) by independent Peer Reviewer 3- The Sample Project Coordinator reviews the project documentation for completeness followed by a QA review by the QAO 4- Final review by Branch Chief/Section Chief prior to release, this review is to ensure completeness and general compliance with the objectives of the project. This final review typically does not include a review of raw data. Details can be found in Laboratory Quality Management Plan.	Primary Analyst, Peer Reviewer, Sample Project Coordinator, Quality Assurance Officer, Section Chief/ Branch Chief. DESA LAB
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	DESA Data Validation Personnel
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	DESA Data Validation Personnel
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	DESA Data Validation Personnel
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	DESA Data Validation Personnel

QAPP Worksheet #36: Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa / IIb	Sediment	TCL VOCs	Low	DESA Data Method and SOP # G-26 Guideline for Laboratory Data Review	DESA Data Validation Personnel, EPA Region 2
IIa / IIb	Sediment	TCL SVOCs	Low/Medium	DESA Data Method and SOP # G-26 Guideline for Laboratory Data Review	DESA Data Validation Personnel, EPA Region 2
IIa / IIb	Sediment	TAL Metals including Hg and Cyanide	Low/Medium	DESA Data Method and SOP # G-26 Guideline for Laboratory Data Review	DESA Data Validation Personnel, EPA Region 2
IIa / IIb	Sediment	TCL PCBs	Low/Medium	DESA Data Method and SOP # G-26 Guideline for Laboratory Data Review	DESA Data Validation Personnel, EPA Region 2
IIa / IIb	Sediment	TCL Pesticides	Low/Medium	DESA Data Method and SOP # G-26 Guideline for Laboratory Data Review	DESA Data Validation Personnel, EPA Region 2

QAPP Worksheet #37: Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: Data, whether generated in the field or by the laboratory, are tabulated and reviewed for Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCCS) by the SPM for field data or the data validator for laboratory data. The review of the PARCC Data Quality Indicators (DQI) will compare with the DQO detailed in the site-specific QAPP, the analytical methods used and impact of any qualitative and quantitative trends will be examined to determine if bias exists. A hard copy of field data is maintained in a designated field or site logbook. Laboratory data packages are validated, and final data reports are generated. All documents and logbooks are assigned unique and specific control numbers to allow tracking and management.

Where applicable, the following documents will be followed to evaluate data for fitness in decision making: EPA QA/G-4, *Guidance on Systematic Planning using the Data Quality Objectives Process*, EPA/240/B-06/001, February 2006, and EPA QA/G-9R, *Guidance for Data Quality Assessment*, A reviewer's Guide EPA/240/B-06/002, February 2006.

Describe the evaluative procedures used to assess overall measurement error associated with the project:
As delineated in the ***Uniform Federal Policy for Implementing Environmental Quality Systems: Evaluating, Assessing and*** Documenting Environmental Data Collection and Use Programs Part 1: UFP-QAPP (EPA-505-B-04-900A, March 2005); Part 2A: UFP-QAPP Workbook (EPA-505-B-04-900C, March 2005); Part 2B: Quality Assurance/Quality Control Compendium: Non-Time Critical QA/QC Activities (EPA-505-B-04-900B, March 2005); "Graded Approach" will be implemented for data collection activities that are either exploratory or where specific decisions cannot be identified, since this guidance indicates that the formal DQO process is not necessary.

QAPP Worksheet #37: Usability Assessment- (Concluded)

Weston Solutions, Inc., RST 2 will conduct sediment sampling as part of the Removal Assessment of the Site. The analytical data from this investigation will be used to assist the EPA in determining the presence and nature of the contaminants at the Site and the adjoining Freshwater Forested/Shrub Wetlands.

Identify the personnel responsible for performing the usability assessment: Site Project Management Team, Data Validation Personnel, and EPA Region 2 OSC

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

A copy of the most current approved QAPP, including any graphs, maps and text reports developed will be provided to all personnel identified on the distribution list.

Attachment A

Figure 1 – Site Location Map

Legend

- Sampling Transects
- Parcel Boundary (approximate)

Wetland Type

- Freshwater Forested/Shrub Wetland
- Freshwater Pond

0 25 50 100 150 200 Feet

N

Weston Solutions, Inc.
Northeast Division

In Association With
Avatar Environmental, LLC.,
H & S Environmental, Inc. and
Scientific and Environmental Associates, Inc.

Figure 2:
Sampling Transects

SUPERIOR BARREL and DRUM
ELK TOWNSHIP, GLOUSTER COUNTY, NEW JERSEY

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL SUPPORT TEAM 2
CONTRACT # EP-W-06-072

DATE MODIFIED: 4/28/2014

GIS ANALYST:	P LISICHENKO
EPA OSC:	M. GREGOR
RST SPM:	P LISICHENKO
FILENAME:	SBD_ProposedSamplLoc.mxd

\\fsed2gis\GIS\Superior Barrel and Drum\TDD 0029-0151\MXD\SBD_ProposedSamplLoc.mxd

Attachment B

EPA/ERT Standard Operating Procedures (SOPs)

SOP No.: 2001 - General Field Sampling Guidelines
SOP No.: 2016 - Sediment Sampling

GENERAL FIELD SAMPLING GUIDELINES

SOP#: 2001
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide general field sampling guidelines that will assist REAC personnel in choosing sampling strategies, location, and frequency for proper assessment of site characteristics. This SOP is applicable to all field activities that involve sampling.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Sampling is the selection of a representative portion of a larger population, universe, or body. Through examination of a sample, the characteristics of the larger body from which the sample was drawn can be inferred. In this manner, sampling can be a valuable tool for determining the presence, type, and extent of contamination by hazardous substances in the environment.

The primary objective of all sampling activities is to characterize a hazardous waste site accurately so that its impact on human health and the environment can be properly evaluated. It is only through sampling and analysis that site hazards can be measured and the job of cleanup and restoration can be accomplished effectively with minimal risk. The sampling itself must be conducted so that every sample collected retains its original physical form and chemical composition. In this way, sample integrity is insured, quality assurance standards are maintained, and the sample can accurately represent the larger body of material under investigation.

The extent to which valid inferences can be drawn from a sample depends on the degree to which the sampling effort conforms to the project's objectives. For example, as few as one sample may produce adequate, technically valid data to address the project's objectives. Meeting the project's objectives requires thorough planning of sampling activities, and implementation of the most appropriate sampling and analytical procedures. These issues will be discussed in this procedure.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected, and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest. Sample preservation, containers, handling, and storage for air and waste samples are discussed in the specific SOPs for air and waste sampling techniques.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The nature of the object or materials being sampled may be a potential problem to the sampler. If a material is homogeneous, it will generally have a uniform composition throughout. In this case, any sample increment can be considered representative of the material. On the other hand, heterogeneous samples present problems to the sampler because of changes in the material over distance, both laterally and vertically.

Samples of hazardous materials may pose a safety threat to both field and laboratory personnel. Proper health and safety precautions should be implemented when handling this type of sample.

Environmental conditions, weather conditions, or non-target chemicals may cause problems and/or interferences when performing sampling activities or when sampling for a specific parameter. Refer to the specific SOPs for sampling techniques.

5.0 EQUIPMENT/APPARATUS

The equipment/apparatus required to collect samples must be determined on a site specific basis. Due to the wide variety of sampling equipment available, refer to the specific SOPs for sampling techniques which include lists of the equipment/apparatus required for sampling.

6.0 REAGENTS

Reagents may be utilized for preservation of samples and for decontamination of sampling equipment. The preservatives required are specified by the analysis to be performed. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

7.0 PROCEDURE

7.1 Types of Samples

In relation to the media to be sampled, two basic types of samples can be considered: the environmental sample and the hazardous sample.

Environmental samples are those collected from streams, ponds, lakes, wells, and are off-site samples that are not expected to be contaminated with hazardous materials. They usually do not require the special handling procedures typically used for concentrated wastes. However, in certain instances, environmental samples can contain elevated concentrations of pollutants and in such cases would have to be handled as hazardous samples.

Hazardous or concentrated samples are those collected from drums, tanks, lagoons, pits, waste piles, fresh spills, or areas previously identified as contaminated, and require special handling procedures because of their potential toxicity or hazard. These samples can be further subdivided based on their degree of hazard; however, care should be taken when handling and shipping any wastes believed to be concentrated regardless of the degree.

The importance of making the distinction between environmental and hazardous samples is two-fold:

(1) Personnel safety requirements: Any sample thought to contain enough hazardous materials to pose a safety threat should be designated as hazardous and handled in a manner which ensures the safety of both field and laboratory personnel.

(2) Transportation requirements: Hazardous samples must be packaged, labeled, and shipped according to the International Air Transport Association (IATA) Dangerous Goods Regulations or Department of Transportation (DOT) regulations and U.S. EPA guidelines.

7.2 Sample Collection Techniques

In general, two basic types of sample collection techniques are recognized, both of which can be used for either environmental or hazardous samples.

Grab Samples

A grab sample is defined as a discrete aliquot representative of a specific location at a given point in time. The sample is collected all at once at one particular point in the sample medium. The representativeness of such samples is defined by the nature of the materials being sampled. In general, as sources vary over time and distance, the representativeness of grab samples will decrease.

Composite Samples

Composites are nondiscrete samples composed of more than one specific aliquot collected at various sampling locations and/or different points in time. Analysis of this type of sample produces an average value and can in certain instances be used as an alternative to analyzing a number of individual grab samples and calculating an average value. It should be noted, however, that compositing can mask problems by diluting isolated concentrations of some hazardous compounds below detection limits.

Compositing is often used for environmental samples and may be used for hazardous samples under certain conditions. For example, compositing of hazardous waste is often performed after compatibility tests have

been completed to determine an average value over a number of different locations (group of drums). This procedure generates data that can be useful by providing an average concentration within a number of units, can serve to keep analytical costs down, and can provide information useful to transporters and waste disposal operations.

For sampling situations involving hazardous wastes, grab sampling techniques are generally preferred because grab sampling minimizes the amount of time sampling personnel must be in contact with the wastes, reduces risks associated with compositing unknowns, and eliminates chemical changes that might occur due to compositing.

7.3 Types of Sampling Strategies

The number of samples that should be collected and analyzed depends on the objective of the investigation. There are three basic sampling strategies: random, systematic, and judgmental sampling.

Random sampling involves collection of samples in a nonsystematic fashion from the entire site or a specific portion of a site. Systematic sampling involves collection of samples based on a grid or a pattern which has been previously established. When judgmental sampling is performed, samples are collected only from the portion(s) of the site most likely to be contaminated. Often, a combination of these strategies is the best approach depending on the type of the suspected/known contamination, the uniformity and size of the site, the level/type of information desired, etc.

7.4 QA Work Plans (QAWP)

A QAWP is required when it becomes evident that a field investigation is necessary. It should be initiated in conjunction with, or immediately following, notification of the field investigation. This plan should be clear and concise and should detail the following basic components, with regard to sampling activities:

- Objective and purpose of the investigation.
- Basis upon which data will be evaluated.
- Information known about the site including location, type and size of the facility, and length of operations/abandonment.
- Type and volume of contaminated material, contaminants of concern (including concentration), and basis of the information/data.
- Technical approach including media/matrix to be sampled, sampling equipment to be used, sample equipment decontamination (if necessary), sampling design and rationale, and SOPs or description of the procedure to be implemented.
- Project management and reporting, schedule, project organization and responsibilities, manpower and cost projections, and required deliverables.
- QA objectives and protocols including tables summarizing field sampling and QA/QC analysis and objectives.

Note that this list of QAWP components is not all-inclusive and that additional elements may be added or altered depending on the specific requirements of the field investigation. It should also be recognized that although a detailed QAWP is quite important, it may be impractical in some instances. Emergency responses and accidental spills are prime examples of such instances where time might prohibit the development of site-specific QAWPs prior to field activities. In such cases, investigators would have to rely on general guidelines and personal judgment, and the sampling or response plans might simply be a strategy based on preliminary information and finalized on site. In any event, a plan of action should be developed, no matter how concise or informal, to aid investigators in maintaining a logical and consistent order to the implementation of their task.

7.5 Legal Implications

The data derived from sampling activities are often introduced as critical evidence during litigation of a hazardous waste site cleanup. Legal issues in which sampling data are important may include cleanup cost recovery, identification of pollution sources and responsible parties, and technical validation of remedial design methodologies. Because of the potential for involvement in legal actions, strict adherence to technical and administrative SOPs is essential, during both the development and implementation of sampling activities.

Technically valid sampling begins with thorough planning and continues through the sample collection and analytical procedures. Administrative requirements involve thorough, accurate

documentation of all sampling activities. Documentation requirements include maintenance of a chain of custody, as well as accurate records of field activities and analytical instructions. Failure to observe these procedures fully and consistently may result in data that are questionable, invalid and non-defensible in court, and the consequent loss of enforcement proceedings.

8.0 CALCULATIONS

Refer to the specific SOPs for any calculations which are associated with sampling techniques.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Refer to the specific SOPs for the type and frequency of QA/QC samples to be analyzed, the acceptance criteria for the QA/QC samples, and any other QA/QC activities which are associated with sampling techniques.

10.0 DATA VALIDATION

Refer to the specific SOPs for data validation activities that are associated with sampling techniques.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures.

SEDIMENT SAMPLING

SOP#: 2016
DATE: 11/17/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

This standard operating procedure (SOP) is applicable to the collection of representative sediment samples. Analysis of sediment may be biological, chemical, or physical in nature and may be used to determine the following:

- toxicity;
- biological availability and effects of contaminants;
- benthic biota;
- extent and magnitude of contamination;
- contaminant migration pathways and source;
- fate of contaminants;
- grain size distribution.

The methodologies discussed in this SOP are applicable to the sampling of sediment in both flowing and standing water. They are generic in nature and may be modified in whole or part to meet the handling and analytical requirements of the contaminants of concern, as well as the constraints presented by site conditions and equipment limitations. However, if modifications occur, they should be documented in a site or personal logbook and discussed in reports summarizing field activities and analytical results.

For the purposes of this procedure, sediments are those mineral and organic materials situated beneath an aqueous layer. The aqueous layer may be either static, as in lakes, ponds, and impoundments; or flowing, as in rivers and streams.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Sediment samples may be collected using a variety of methods and equipment, depending on the depth of the aqueous layer, the portion of the sediment profile required (surface vs. subsurface), the type of sample required (disturbed vs. undisturbed), contaminants present, and sediment type.

Sediment is collected from beneath an aqueous layer either directly, using a hand held device such as a shovel, trowel, or auger; or indirectly, using a remotely activated device such as an Ekman or Ponar dredge. Following collection, sediment is transferred from the sampling device to a sample container of appropriate size and construction for the analyses requested. If composite sampling techniques are employed, multiple grabs are placed into a container constructed of inert material, homogenized, and transferred to sample containers appropriate for the analyses requested. The homogenization procedure should not be used if sample analysis includes volatile organics; in this case, sediment, or multiple grabs of sediment, should be transferred directly from the sample collection device or homogenization container to the sample container.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

1. Chemical preservation of solids is generally not recommended. Cooling to 4°C is usually the best approach, supplemented by the appropriate holding time for the analyses requested.

2. Wide mouth glass containers with Teflon lined caps are utilized for sediment samples. The sample volume is a function of the analytical requirements and will be specified in the Work Plan.

3. If analysis of sediment from a discrete depth or location is desired, sediment is transferred directly from the sampling device to a labeled sample container(s) of appropriate size and construction for the analyses

requested. Transfer is accomplished with a stainless steel or plastic lab spoon or equivalent.

4. If composite sampling techniques or multiple grabs are employed, equal portions of sediment from each location are deposited into a stainless steel, plastic, or other appropriate composition (e.g., Teflon) containers. The sediment is homogenized thoroughly to obtain a composite representative of the area sampled. The composite sediment sample is transferred to a labeled container(s) of appropriate size and construction for the analyses requested. Transfer of sediment is accomplished with a stainless steel or plastic lab spoon or equivalent. Samples for volatile organic analysis must be transferred directly from the sample collection device or pooled from multiple areas in the homogenization container prior to mixing. This is done to minimize loss of contaminant due to volatilization during homogenization.

5. All sampling devices should be decontaminated, then wrapped in aluminum foil. The sampling device should remain in this wrapping until it is needed. Each sampling device should be used for only one sample. Disposable sampling devices for sediment are generally impractical due to cost and the large number of sediment samples which may be required. Sampling devices should be cleaned in the field using the decontamination procedure described in the Sampling Equipment Decontamination SOP.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Substrate particle size and organic matter content are a direct consequence of the flow characteristics of a waterbody. Contaminants are more likely to be concentrated in sediments typified by fine particle size and a high organic matter content. This type of sediment is most likely to be collected from depositional zones. In contrast, coarse sediments with low organic matter content do not typically concentrate pollutants and are generally found in erosional zones. The selection of a sampling location can, therefore, greatly influence the analytical results and should be justified and specified in the Work Plan.

5.0 EQUIPMENT/APPARATUS

Equipment needed for collection of sediment samples may include:

- C Maps/plot plan
- C Safety equipment
- C Compass
- C Tape measure
- C Survey stakes, flags, or buoys and anchors
- C Camera and film
- C Stainless steel, plastic, or other appropriate composition bucket
- C 4-oz., 8-oz., and one-quart wide mouth jars w/Teflon lined lids
- C Ziploc plastic bags
- C Logbook
- C Sample jar labels
- C Chain of Custody records, field data sheets
- C Cooler(s)
- C Ice
- C Decontamination supplies/equipment
- C Spade or shovel
- C Spatula
- C Scoop
- C Trowel
- C Bucket auger
- C Tube auger
- C Extension rods
- C "T" handle
- C Sediment coring device (tube, drive head, eggshell check value, nosecone, acetate tube, extension rods, "T" handle)
- C Ponar dredge
- C Ekman dredge
- C Nylon rope or steel cable
- C Messenger device

6.0 REAGENTS

Reagents are not used for preservation of sediment samples. Decontamination solutions are specified in the Sampling Equipment Decontamination SOP.

7.0 PROCEDURES

7.1 Preparation

1. Determine the objective(s) and extent of the sampling effort. The sampling methods to be employed, and the types and amounts of equipment and supplies required will be a function of site characteristics and objectives of the study.

2. Obtain the necessary sampling and monitoring equipment.

3. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.

4. Decontaminate or preclean equipment, and ensure that it is in working order.

5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors including flow regime, basin morphometry, sediment characteristics, depth of overlying aqueous layer, contaminant source, and extent and nature of contamination should be considered when selecting sample locations. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.

7.2 Sample Collection

Selection of a sampling device is most often contingent upon: (1) the depth of water at the sampling location, and (2) the physical characteristics of the sediment to be sampled. The following procedures may be utilized:

7.2.1 Sampling Surface Sediment with a Trowel or Scoop from Beneath a Shallow Aqueous Layer

For the purpose of this method, surface sediment is considered to range from 0 to six inches in depth and a shallow aqueous layer is considered to range from 0 to 12 inches in depth. Collection of surface sediment from beneath a shallow aqueous layer can be accomplished with tools such as spades, shovels, trowels, and scoops. Although this method can be used to collect both unconsolidated/consolidated sediment, it is limited somewhat by the depth and movement of the aqueous layer. Deep and rapidly flowing water render this method less accurate than others discussed below. However, representative samples can be collected with this procedure in shallow sluggish water provided care is demonstrated by the sample team member. A stainless steel or plastic sampling implement will suffice in most applications. Care should be exercised to avoid the use of devices plated with chrome or other materials; plating is particularly common with garden trowels.

The following procedure will be used to collect sediment with a scoop, shovel, or trowel:

1. Using a decontaminated sampling implement, remove the desired thickness and volume of sediment from the sampling area.

2. Transfer the sample into an appropriate sample or homogenization container. Ensure that non-dedicated containers have been adequately decontaminated.

3. Surface water should be decanted from the sample or homogenization container prior to sealing or transfer; care should be taken to retain the fine sediment fraction during this procedure.

7.2.2 Sampling Surface Sediment with a Bucket Auger or Tube Auger from Beneath a Shallow Aqueous Layer

For the purpose of this method, surface sediment is considered to range from 0 to six inches in depth and a shallow aqueous layer is considered to range from 0 to 24 inches in depth. Collection of surface sediment from beneath a shallow aqueous layer can be accomplished with a system consisting of bucket auger or tube auger, a series of extensions, and a "T" handle (Figure 1, Appendix A). The use of additional extensions in conjunction with a bucket auger can increase the depth of water from which sediment can be collected from 24 inches to 10 feet or more. However, sample handling and manipulation increases in difficulty with increasing depth of water. The bucket auger or tube auger is driven into the sediment and used to extract a core. The various depths represented by the core are homogenized or a subsample of the core is taken from the appropriate

depth.

The following procedure will be used to collect sediment samples with a bucket auger or tube auger:

1. An acetate core may be inserted into the bucket auger or tube auger prior to sampling if characteristics of the sediments or waterbody warrant. By using this technique, an intact core can be extracted.

2. Attach the auger head to the required length of extensions, then attach the "T" handle to the upper extension.

3. Clear the area to be sampled of any surface debris.

4. Insert the bucket auger or tube auger into the sediment at a 0° to 20° angle from vertical. This orientation minimizes spillage of the sample from the sampler upon extraction from the sediment and water.

5. Rotate the auger to cut a core of sediment.

6. Slowly withdraw the auger; if using a tube auger, make sure that the slot is facing upward.

7. Transfer the sample or a specified aliquot of sample into an appropriate sample or homogenization container. Ensure that non-dedicated containers have been adequately decontaminated.

7.2.3 Sampling Deep Sediment with a Bucket Auger or Tube Auger from Beneath a Shallow Aqueous Layer

For the purpose of this method, deep sediment is considered to range from six to greater than 18 inches in depth and a shallow aqueous layer is considered to range from 0 to 24 inches. Collection of deep sediment from beneath a shallow aqueous layer can be accomplished with a system consisting of a bucket auger, a tube auger, a series of extensions and a "T" handle. The use of additional extensions can increase the depth of water from which sediment can be collected from 24 inches to five feet or more. However, water clarity must be high enough to permit the sampler to directly observe the sampling operation. In addition, sample handling and manipulation increases in difficulty with increasing depth of water. The bucket auger is used to bore a hole to the upper range of the desired sampling depth and then withdrawn. The tube auger is then lowered down the borehole, and driven into the sediment to the lower range of the desired sampling depth. The tube is then withdrawn and the sample recovered from the tube. This method can be used to collect firmly consolidated sediments, but is somewhat limited by the depth of the aqueous layer, and the integrity of the initial borehole.

The following procedure will be used to collect deep sediment samples with a bucket auger and a tube auger:

1. Attach the bucket auger bit to the required lengths of extensions, then attach the "T" handle to the upper extension.

2. Clear the area to be sampled of any surface debris.

3. Begin augering, periodically removing any accumulated sediment (i.e., cuttings) from the auger bucket. Cuttings should be disposed of far enough from the sampling area to minimize cross contamination of various depths.

4. After reaching the upper range of the desired depth, slowly and carefully remove bucket auger from the boring.

5. Attach the tube auger bit to the required lengths of extensions, then attach the "T" handle to the upper extension.

6. Carefully lower tube auger down borehole using care to avoid making contact with the borehole sides and, thus, cross contaminating the sample. Gradually force tube auger into sediment to the lower range of the desired sampling depth. Hammering of the tube auger to facilitate coring should be avoided as the vibrations may cause the boring walls to collapse.

7. Remove tube auger from the borehole, again taking care to avoid making contact with the borehole sides and, thus, cross contaminating

the sample.

8. Discard the top of core (approximately 1 inch); as this represents material collected by the tube auger before penetration to the layer of concern.

9. Transfer sample into an appropriate sample or homogenization container. Ensure that non-dedicated containers have been adequately decontaminated.

7.2.4 Sampling Surface Sediment with an Ekman or Ponar Dredge from Beneath a Shallow or Deep Aqueous Layer

For the purpose of this method, surface sediment is considered to range from 0 to six inches in depth. Collection of surface sediment can be accomplished with a system consisting of a remotely activated device (dredge) and a deployment system. This technique consists of lowering a sampling device (dredge) to the surface of the sediment by use of a rope, cable, or extended handle. The mechanism is activated, and the device entraps sediment in spring loaded or lever operated jaws.

An Ekman dredge is a lightweight sediment sampling device with spring activated jaws. It is used to collect moderately consolidated, fine textured sediment. The following procedure will be used for collecting sediment with an Ekman dredge (Figure 2, Appendix A):

1. Attach a sturdy nylon rope or stainless steel cable through the hole on the top of the bracket, or secure the extension handle to the bracket with machine bolts.

2. Attach springs to both sides of the jaws. Fix the jaws so that they are in open position by placing trip cables over the release studs. Ensure that the hinged doors on the dredge top are free to open.

3. Lower the sampler to a point 4 to 6 inches above the sediment surface.

4. Drop the sampler to the sediment.

5. Trigger the jaw release mechanism by lowering a messenger down the line, or by depressing the button on the upper end of the extension handle.

6. Raise the sampler and slowly decant any free liquid through the top of the sampler. Care should be taken to retain the fine sediment fraction during this procedure.

7. Open the dredge jaws and transfer the sample into a stainless steel, plastic or other appropriate composition (e.g., Teflon) container. Ensure that non-dedicated containers have been adequately decontaminated. If necessary, continue to collect additional sediment grabs until sufficient material has been secured to fulfill analytical requirements. Thoroughly homogenize and then transfer sediment to sample containers appropriate for the analyses requested. Samples for volatile organic analysis must be collected directly from the bucket before homogenization to minimize volatilization of contaminants.

A Ponar dredge is a heavyweight sediment sampling device with weighted jaws that are lever or spring activated. It is used to collect consolidated fine to coarse textured sediment. The following procedure will be used for collecting sediment with a Ponar dredge (Figure 3, Appendix A):

1. Attach a sturdy nylon rope or steel cable to the ring provided on top of the dredge.

2. Arrange the Ponar dredge with the jaws in the open position, setting the trip bar so the sampler remains open when lifted from the top. If the dredge is so equipped, place the spring loaded pin into the aligned holes in the trip bar.

3. Slowly lower the sampler to a point approximately two inches above the sediment.

4. Drop the sampler to the sediment. Slack on the line will release the trip bar or spring loaded pin; pull up sharply on the line closing the dredge.

5. Raise the dredge to the surface and slowly

decant any free liquid through the screens on top of the dredge. Care should be taken to retain the fine sediment fraction during this operation.

6. Open the dredge and transfer the sediment to a stainless steel, plastic or other appropriate composition (e.g., Teflon) container. Ensure that non-dedicated containers have been adequately decontaminated. If necessary, continue to collect additional sediment until sufficient material has been secured to fulfill analytical requirements. Thoroughly homogenized and then transfer sediment to sample containers appropriate for the analyses requested. Samples for volatile organic analysis must be collected directly from the bucket before homogenization to minimize volatilization of contaminants.

7.2.5 Sampling Subsurface Sediment with a Coring Device from Beneath a Shallow Aqueous Layer

For purposes of this method, subsurface sediment is considered to range from 6 to 24 inches in depth and a shallow aqueous layer is considered to range from 0 to 24 inches in depth. Collection of subsurface sediment from beneath a shallow aqueous layer can be accomplished with a system consisting of a tube sampler, acetate tube, eggshell check valve, nosecone, extensions, and "T" handle, or drivehead. The use of additional extensions can increase the depth of water from which sediment can be collected from 24 inches to 10 feet or more. This sampler may be used with either a drive hammer for firm sediment, or a "T" handle for soft sediment. However, sample handling and manipulation increases in difficulty with increasing depth of water.

The following procedure describes the use of a sample coring device (Figure 4, Appendix A) used to collect subsurface sediments.

1. Assemble the coring device by inserting the acetate core into the sampling tube.

2. Insert the "egg shell" check valve into the lower end of the sampling tube with the convex surface positioned inside the acetate core.

3. Screw the nosecone onto the lower end of the sampling tube, securing the acetate tube and eggshell check valve.

4. Screw the handle onto the upper end of the sampling tube and add extension rods as needed.

5. Place the sampler in a perpendicular position on the sediment to be sampled.

6. If the "T" handle is used, place downward pressure on the device until the desired depth is reached. After the desired depth is reached, rotate the sampler to shear off the core at the bottom. Slowly withdraw the sampler from the sediment and proceed to Step 15.

7. If the drive hammer is selected, insert the tapered handle (drive head) of the drive hammer through the drive head.

8. Drive the sampler into the sediment to the desired depth.

9. Record the length of the tube that penetrated the sample material, and the number of blows required to obtain this depth.

10. Remove the drive hammer and fit the keyhole-like opening on the flat side of the hammer onto the drive head. In this position, the hammer serves as a handle for the sampler.

11. Rotate the sampler to shear off the core at the bottom.

12. Lower the sampler handle (hammer) until it just clears the two ear-like protrusions on the drive head, and rotate about 90°.

13. Slowly withdraw the sampler from the sediment. If the drivehead was used, pull the hammer upwards and dislodge the sampler from the sediment.

14. Carefully remove the coring device from the water.

15. Unscrew the nosecone and remove the

eggshell check valve.

16. Slide the acetate core out of the sampler tube. Decant surface water, using care to retain the fine sediment fraction. If head space is present in the upper end, a hacksaw may be used to shear the acetate tube off at the sediment surface. The acetate core may then be capped at both ends. Indicate on the acetate tube the appropriate orientation of the sediment core using a waterproof marker. The sample may be used in this fashion, or the contents transferred to a sample or homogenization container.

17. Open the acetate tube and transfer the sediment to a stainless steel, plastic or other appropriate composition (e.g., Teflon) container. Ensure that non-dedicated containers have been adequately decontaminated. If necessary, continue to collect additional sediment until sufficient material has been secured to fulfill analytical requirements. Thoroughly homogenize and then transfer sediment to sample containers appropriate for the analyses requested. Samples for volatile organic analysis must be collected directly from the bucket before homogenization to minimize volatilization of contaminants.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA/OSHA and Corporate health and safety procedures.

More specifically, when sampling sediment from waterbodies, physical hazards must be identified and adequate precautions must be taken to ensure the safety of the sampling team. The team member collecting the sample should not get too close to the edge of the waterbody, where bank failure may cause loss of balance. To prevent this, the person performing the sampling should be on a lifeline, and be wearing adequate protective equipment. If sampling from a vessel is determined to be necessary, appropriate protective measures must be implemented.

12.0 REFERENCES

Mason, B.J., Preparation of Soil Sampling Protocol: Technique and Strategies. 1983 EPA-600/4-83-020.

Barth, D.S. and B.J. Mason, Soil Sampling Quality Assurance User's Guide. 1984 EPA-600/4-84-043.

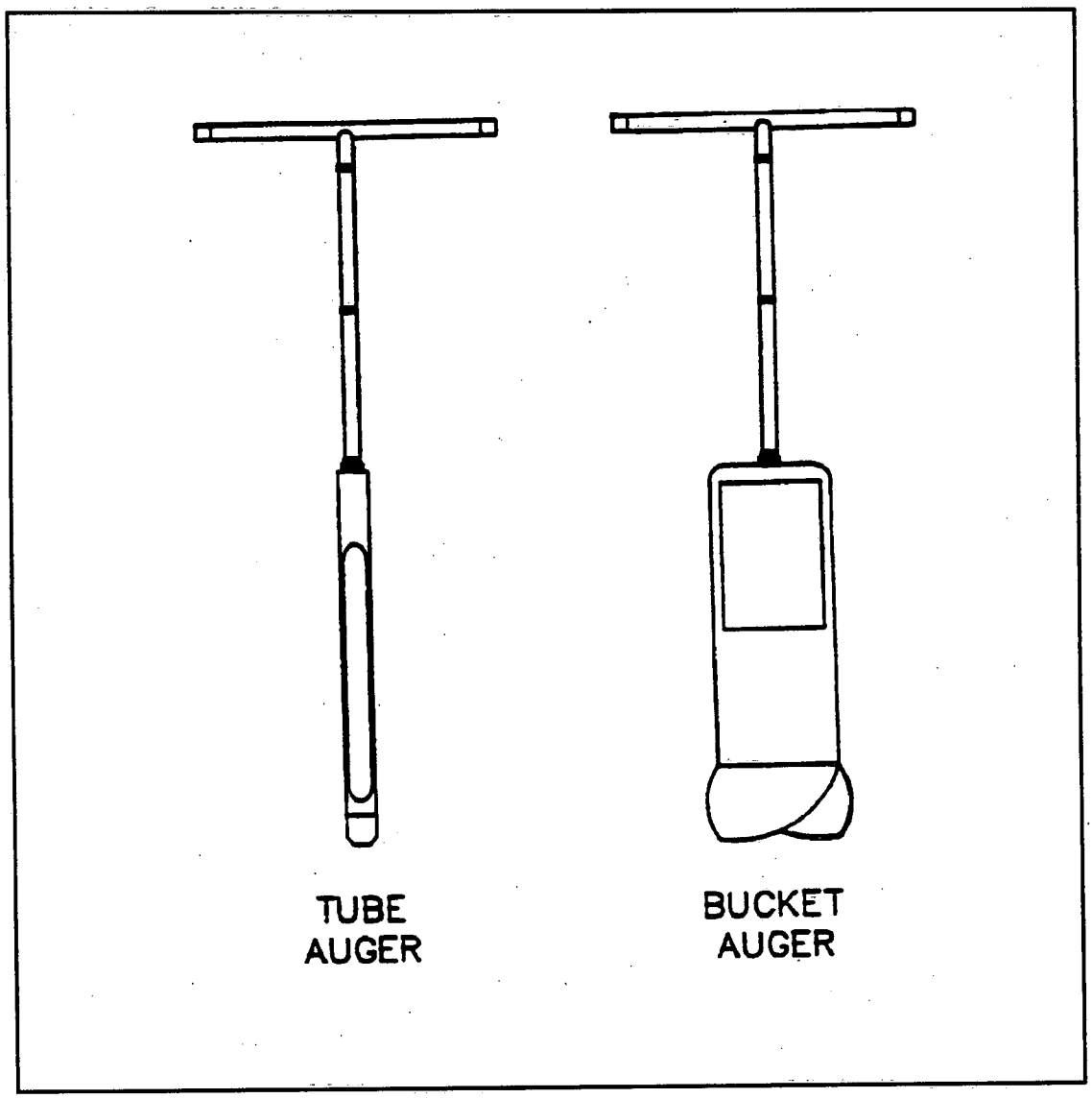
U.S. EPA. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. 1984 EPA-600/4-84-076.

de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. Samplers and Sampling Procedures for Hazardous Waste Streams. 1980 EPA-600/2-80-018.

APPENDIX A

Figures

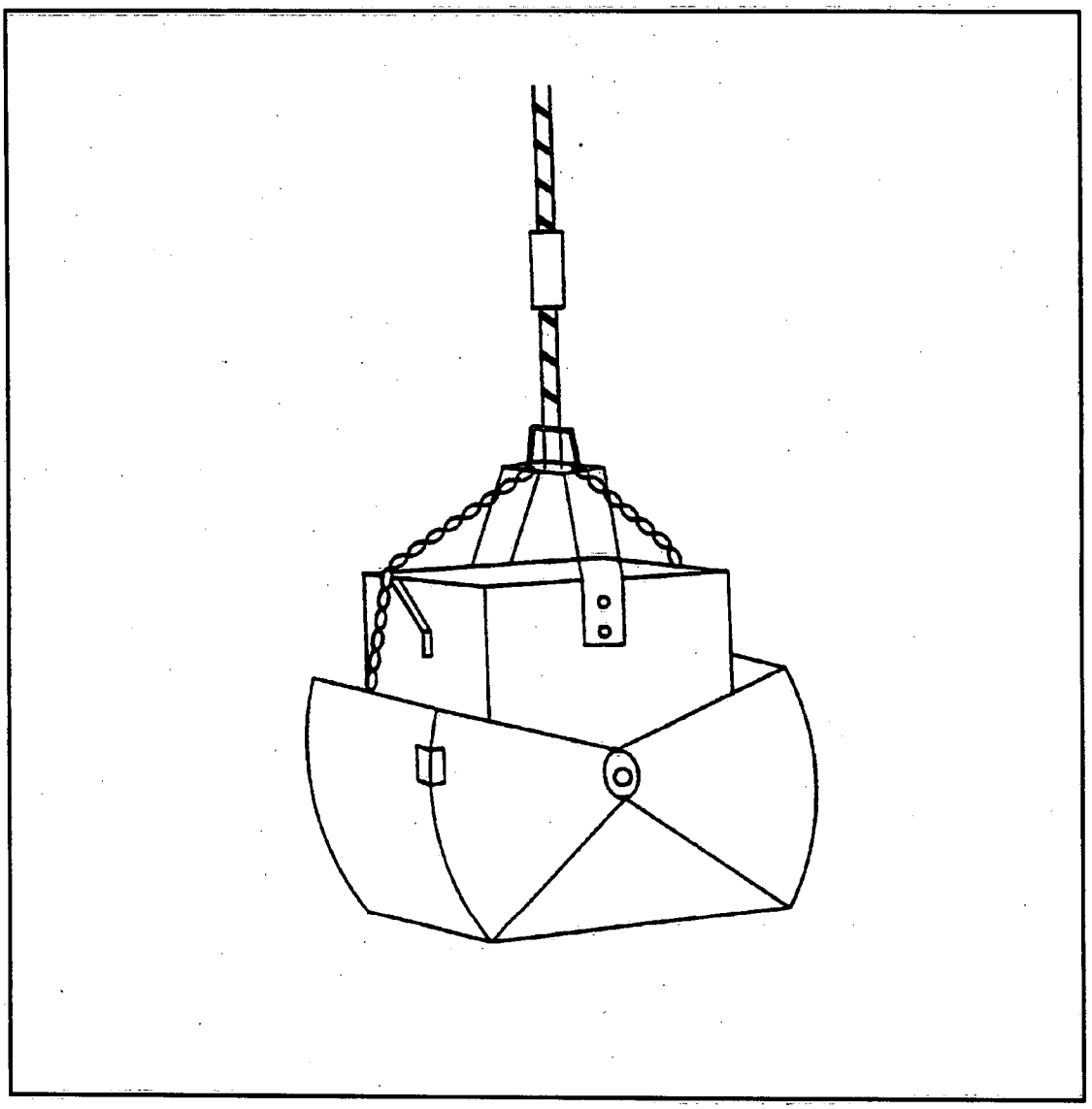
FIGURE 1. Sampling Auger



APPENDIX A (Cont'd)

Figures

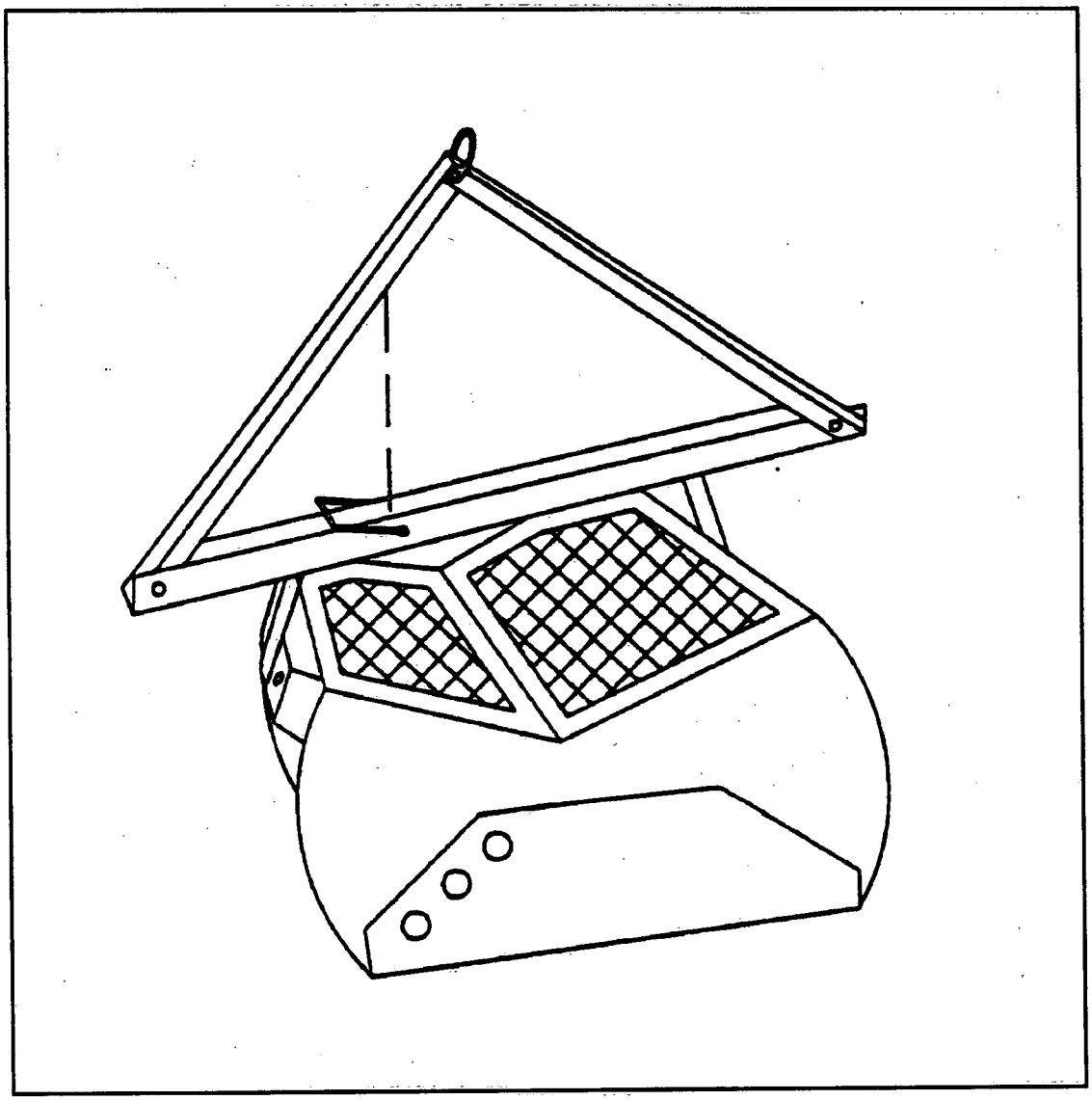
FIGURE 2. Ekman Dredge



APPENDIX A (Cont'd)

Figures

FIGURE 3. Ponar Dredge



APPENDIX A (Cont'd)

Figures

FIGURE 4. Sample Coring Device